MOUNT RUSHMORE NATIONAL MEMORIAL EFFLUENT RECYCLING SYSTEM

Environmental Assessment

DECEMBER 2003

U.S. Department of the Interior
National Park Service

TABLE OF CONTENTS

ITEM **PAGE**

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1
PURPOSE AND NEED

1.1 INTRODUCTION

This Environmental Assessment (EA) documents the results of a study of the potential environmental impacts of an action proposed by the National Park Service (NPS) to construct and implement a wastewater effluent recycling system for the purposes of reusing discharged effluent for useful purposes throughout the Memorial and to reduce the impact on the Park's supply of freshwater.

Purposes of an Environmental Assessment (EA)

There are three primary purposes of an EA:

1. To help determine whether the impact of a proposed action or alternative could be significant, thus an environmental impact statement (EIS) is needed;
2. To aid in compliance with NEPA when no EIS is necessary by evaluating a proposal that will have no significant impacts, but that may have measurable adverse impacts; and
3. To facilitate preparation of an EIS if one is necessary.

This EA has been prepared in compliance with the:

- National Environmental Policy Act (NEPA) of 1969 (42 United States Code (USC) 4321 et seq.), which requires an environmental analysis for major Federal Actions having the potential to impact the quality of the environment;
- Council of Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR) 1500 through 1508, which implement the requirements of NEPA; and
- NPS NEPA compliance guidance handbook (Director's Order #12, Conservation Planning, Environmental Impact Analysis, and Decision-making).

Key goals of NEPA are to help Federal agency officials make well-informed decisions about agency actions and provide a role for the general public in the decision-making process. The study and documentation mechanisms associated with NEPA seek to provide decision-makers with sound knowledge of the comparative environmental consequences of the several courses of action available to them. NEPA studies and the documents recording their results, such as this EA, focus on providing input to the particular decisions faced by the relevant officials.

In making decisions about NPS-administered resources, the Service is guided by the requirements of the 1916 Organic Act and other laws, such as the Clean Air Act (CAA), Clean Water Act (CWA), and Endangered Species Act. The authority for the conservation and management of the NPS is clearly stated in the Organic Act, which states the agency's purpose:

> *"...to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."*

This authority was further clarified in the National Parks and Recreation Act of 1978:

> *"Congress declares that...these areas, though distinct in character, are united...into one national park system.... The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."*

The busts of four American Presidents – George Washington, Thomas Jefferson, Abraham Lincoln, and Theodore Roosevelt – were sculpted on the southeastern granite face of Mount Rushmore as "…a memorial…commemorative of our national history and progress…" (Act of March 3, 1925). This basic legislation authorized the carving and established the purpose of what was to become Mount Rushmore National Memorial. Subsequent legislation included charges to "administer, protect, and develop" the Memorial. President Franklin Delano Roosevelt placed Mount Rushmore under the jurisdiction of the NPS by executive order on June 10, 1933. The purpose for which the Park was established is to preserve and protect the Memorial sculpture and the natural setting, to provide access to the public, and for the inspirational and educational appreciation of the cultural and natural resources of the Memorial.

The requirements placed on the NPS by these laws, especially the Organic Act, mandate that resources are passed on to future generations "unimpaired" (NPS, 2001a). This EA addresses whether the actions of the various alternatives proposed by Mount Rushmore National Memorial impair resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the Memorial, (2) key to the natural or cultural integrity of the Memorial or opportunities for enjoyment of the Memorial, and/or (3) identified as a goal in the Memorial's General Management Plan or other NPS planning documents (see *Chapter 3 – Environmental Consequences*).

1.2 BACKGROUND

The 1,238-acre Mount Rushmore National Memorial is located on the central slope of the Black Hills of western South Dakota, in Pennington County. The Black Hills are a forested mountain range in southwest South Dakota and northern Wyoming covering approximately 2 million acres. Granite knobs, peaks, ridges, and valleys covered with ponderosa pine and dotted with meadows characterize Mount Rushmore. Nearby communities include Rapid City, Hill City, and Keystone (which borders the northeast corner of the Memorial). Federal, State, and private lands surround the Memorial, including the Black Elk Wilderness Area, the Peter Norbeck Wildlife Preserve, and the Hell Canyon and Mystic Districts of the Black Hills National Forest. **Figure 1-1** provides an aerial view of the Memorial grounds.

Approximately 3 million people visited the Memorial during fiscal year 2002. Several facilities are located on the Memorial, including a Visitor Center and amphitheatre, a concession complex,

a dormitory, and the Sculptor's Studio. The NPS holds three water rights to serve as the water source for these facilities (a well, Mount Rushmore springs, and Grizzly Bear spring) (Thunstrom, 2003a).

One well currently provides the Park's freshwater supply. Water from the well is disinfected and chemically treated for pH adjustment, and then is pumped to reservoirs for storage. All potable water used at the Memorial comes from the well, which has been in use since 1969. During that same year, the Black Hills was experiencing one of its worst droughts. Data from a U.S. Geological Survey study conducted at that time indicated that prolonged periods of drought could cause well water shortages. Approximately 7 million gallons of water are pumped from the well annually, the majority between April and September (the highest visitation months). Water from the well is pumped to a main 0.5-million gallon reservoir located at the well, and then to two pressure reservoirs (0.2 million gallons total) above the visitor/services area. On average, approximately 19,000 gallons of freshwater is used daily for residential and visitor use. In addition, approximately 36,000 gallons per day from April to September are used for grounds irrigation and vehicle and pavement cleaning. Water pumping records at the Memorial indicate that total freshwater use during the peak summer season can reach 75,000 gallons per day (Foss, 2003b).

The NPS has attempted several practices at the Memorial to reduce the amount of water used for grounds irrigation and vehicle/pavement cleaning. The NPS has tried the use of sweeping and dry scrubbing instead of hosing off pavement and vehicles to conserve water at the Memorial. However, these practices produced poor results and were discontinued. The Park has also tried to discontinue grounds irrigation. Discontinuing this practice resulted in the death of much of the vegetation in the landscaped areas. The NPS put great effort into planting the Memorial grounds back to native vegetation during the Memorial's major redevelopment project several years ago, and irrigation is necessary to maintain this landscaping. Finally, the NPS has changed its practice of hosing out the parking facility on the Memorial. No longer allowing this practice has reduced water use, but not to a significant level.

In addition to the water uses described above, significant water losses have occurred due to irrigation system leaks and contractor waste during construction and maintenance activities at the Memorial. Additional uses of the water supply at the Memorial have been identified, including expanding irrigation, fire suppression, and mitigation. These additional uses would increase demands on the existing water supply and could cause a water shortage during periods of drought.

Once the water is used, it undergoes treatment at the newly constructed (2002), state-of-the-art wastewater treatment facility (water used for irrigation and cleaning does not get returned to the treatment facility). The new facility has an expected 30-year life cycle and is designed to treat a maximum of 75,000 gallons per day (NPS, 2000a). During the peak tourist season, this treatment facility discharges an average of 45,000 gallons of effluent per day into Lafferty Gulch, which is located directly behind the facility and drains into Battle Creek. The effluent is of high quality and is allowed by the South Dakota Department of Environment and Natural Resources (DENR) to be discharged into an active trout stream.

Numerous opportunities exist for the reuse of the large volume of effluent currently discharged at the Memorial, including grounds irrigation, parking lot and vehicle cleaning, and structural and

wildland fire mitigation and suppression. The existing grounds irrigation system can be retrofitted with new sprinkler heads to reuse the effluent for irrigation of landscaped areas throughout the Memorial. Wastewater can also be used for cleaning pavement in the parking lot and washing Park vehicles. Currently, the Park's freshwater supply is used for these purposes.

One hundred years of wildland fire suppression in the region has resulted in an increased density of pine stands and abundant ladder fuels (e.g., dead and dry lower limbs, small trees), which create ideal conditions for severe crown fires. The historic pre-European settlement pattern of frequent, low-severity ground fire, which removed ground fuels, has shifted to a pattern of potentially high severity wildfires that may threaten life, property, and Memorial resources. Two recent fires in the area highlight this problem. On August 16, 2002, the Battle Creek Fire ignited on private land near Keystone, South Dakota. Due to high temperatures, low relative humidities, and strong winds, the fire burned for four days, spotting across Highway 40, South Rockerville Road, and Highway 16 before it was contained. The fire burned a total of 12,450 acres, and threatened over 600 structures and the town of Keystone (USFS, 2002). Suppression costs totaled over $7 million, and required Federal funding aid (USFS, 2002; FEMA, 2002). A more recent fire occurred in the town of Keystone on June 18, 2003. This fire leveled nine businesses, some of which were the town's most well-known tourist attractions catering to tourists visiting Mount Rushmore National Memorial, before it was extinguished (Holland and Daly, 2003).

To protect Memorial resources and surrounding areas from fire, the effluent could be reused for structural and wildland fire mitigation and suppression. The potential for wildfire ignition at the Memorial could be minimized by irrigating areas of high fire risk to moisten the ground surface. Wildland fires threatening Mount Rushmore and nearby towns such as Keystone could also be suppressed by using stored effluent for firefighting.

1.3 PURPOSE AND NEED

The Park proposes to address the potential shortage of freshwater supplies, the large volume of effluent discharged into Lafferty Gulch, and the threat of wildfires by implementing an effluent recycling system which takes advantage of the existing state-of-the-art wastewater treatment plant and other existing facilities on the Memorial.

The overall purpose or goals of the proposed effluent recycling system are to:

- Reuse the effluent discharged from the wastewater treatment plant for useful purposes throughout the Memorial, including grounds irrigation, structural and wildland fire mitigation and suppression, and vehicle and pavement cleaning;

- Reduce the impact on the Park's freshwater supply; and

- Reduce the volume of effluent discharged into Lafferty Gulch.

1.4 SCOPING ISSUES AND IMPACT TOPICS

On May 9, 2003, scoping letters describing the Proposed Action and requesting public comments were sent to a mailing list of 250 individuals and organizations. On June 2, 2003, the Memorial issued a press release in the *Rapid City Journal* inviting the public to an open house to discuss the Proposed Action and offer their thoughts and concerns about the advantages, disadvantages, and impacts that might occur as a result of the proposed project. The open house was held on June 4, 2003 at the Keystone Community Center in Keystone, South Dakota. The NPS also conducted an internal scoping meeting at the Memorial with members of the interdisciplinary team on June 2, 2003.

The major issues and concerns that came from the open house, internal scoping meeting, and other public input (e.g., correspondence in both writing and over email and the telephone) were evaluated and sorted. The Memorial received four written comments from interested parties during the scoping process.

Issues can be defined as the relationship between the Proposed Action or its alternatives and the human and natural environment. Issues are used to define which environmental resources may experience either detrimental or beneficial consequences from an action; they do not predict the degree or intensity of potential consequences that might result from an action. Issues were identified by the interdisciplinary team, State and Federal agencies, a review of similar construction projects, and by the public during the scoping process.

From these issues, impact topics were developed for each affected environmental resource area. Impact topics address the potential consequences on the human and natural environment that might result from the Proposed Action or its alternatives. Impact topics are used to define and focus the discussion of the affected environment for each resource area, and the analysis of the potential environmental consequences of an action. These topics also derive from relevant Federal laws, regulations, and orders, as well as NPS *Management Policies* (NPS, 2000b) and resource area expertise. A summary of issues and impact topics analyzed in detail in this EA is presented in Section 1.4.1. Those impact topics analyzed and dismissed from further analysis in this EA are described in Section 1.4.2, along with the rationale for their inclusion or dismissal. **Table 1-1** provides a summary of the issues considered in detail and dismissed from further analysis in this EA.

1.4.1 Impact Topics Selected for Detailed Analysis

The following issues and impact topics are analyzed in this EA:

Soils and Geology: Concerns have been expressed that an effluent irrigation system would increase soil erosion at the Memorial. In addition, soils would be affected during construction of the main distribution trunk line and water storage tank/reservoir from soil compaction, vegetation removal, and disturbance due to excavation. The underlying bedrock in the area could limit excavation required for the reservoir alternative, and could require blasting. Therefore, impacts to soils and geology are analyzed in this EA.

Water Resources: NPS policies require protection of water resources consistent with the Federal CWA. During construction, there is the potential for water quality degradation due to increased surface water runoff and increased sedimentation to nearby streams. Reusing wastewater effluent would benefit the Memorial's freshwater supply by reducing demand and the water quality of Lafferty Gulch and downstream waters by reducing effluent discharge. Construction of an open reservoir for water storage has the potential to attract wildlife, which may contaminate water quality in the reservoir. In addition, effluent storage for reuse may alter the hydrology of Lafferty Gulch. Concerns have also been expressed that the effluent may not be of suitable quality to reuse on Memorial grounds and that there may be increased surface water runoff. Therefore, impacts to water resources are analyzed in detail in this EA.

Vegetation and Wildlife: Implementation of an effluent recycling system may affect vegetation and wildlife by encouraging unnatural vegetative growth (including noxious weeds), decreasing the water volume discharged into Lafferty Gulch, and enhancing water quality by reducing effluent discharge. In addition, an open reservoir has the potential to attract wildlife, and potentially expose wildlife to toxic levels of bacteria and other contaminants. Therefore, impacts on vegetation and wildlife are discussed in detail in this EA.

Air Quality: The Federal 1970 CAA stipulates that Federal agencies have an affirmative responsibility to protect a Park's air quality from adverse air pollution impacts. While Mount Rushmore National Memorial generally enjoys excellent air quality, it is not pristine air quality. Construction activities would involve the use of emissions-generating vehicles and equipment, which may have short-term impacts on air quality. Over the long-term, the effluent recycling system would decrease the potential for wildfires to occur by allowing for irrigation of high fire risk areas and suppression of wildfires using stored effluent, which would decrease the potential for air quality impacts due to smoke. Therefore, impacts on air quality are analyzed in this EA.

Noise: Noise is defined as unwanted sound. Construction activities would involve the use of noise-generating equipment, which as the potential to affect visitors, Memorial staff, and wildlife. Therefore, this impact topic is analyzed further in this EA.

Visual Quality: Construction activities and disturbance have the potential to impact the visual quality at the Memorial over the short-term. Long-term impacts on visual quality could result from the presence of a storage tank or reservoir. Visual quality impacts have the potential to affect visitors' experiences at the Memorial. Therefore, impacts on visual quality are analyzed in this EA.

Visitor Use and Experience, Including Park Operations: The 1916 NPS Organic Act directs the Service to provide for public enjoyment of the scenery, wildlife and natural and historic resources of National Parks "in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations." Construction activities may temporarily disrupt visitor experience directly through area closures and indirectly due to noise, visual quality impacts, and other disturbances. In addition, the public has expressed concerns that odors from the reused effluent may degrade the area. Over the long-term, an effluent recycling system would likely benefit Park facilities and operations. Therefore, impacts on visitor use and experience are addressed in this EA.

Socioeconomics: NEPA requires an analysis of impacts to the "human environment" which includes economic, social, and demographic elements in the affected area. Implementation and operation of the proposed project would incur short- and long-term costs to the Memorial, however the Memorial may also save money over the long-term from decreased costs associated with decreased freshwater use. Therefore, this impact topic is included for further analysis in this EA.

Human Health and Safety: The quality of the effluent has the potential to affect public and worker health and safety at the Memorial. In addition, an open reservoir may attract mosquitoes exposing people in the area to potential health risks. The use of effluent for grounds irrigation, particularly during dry periods, would decrease the potential for a wildfire to occur. Wildfires can be extremely hazardous, even life-threatening, to humans. In the event of a fire, the effluent irrigation system would be used for fire suppression. Due to the decreased potential for wildfire occurrence and increased fire suppression capabilities, fewer dangers to firefighting crews would be anticipated in the event of a wildfire. Therefore, impacts to human health and safety are addressed in this EA.

Cultural Resources: Section 106 of the National Historic Preservation Act (NHPA) of 1966 provides the framework for Federal review and protection of cultural resources, and ensures that they are considered during Federal project planning and execution. Construction activities associated with installation of an effluent recycling system have the potential to affect cultural resources. Therefore, potential impacts to cultural resources are addressed in this EA.

Utilities and Public Services: Construction activities have the potential to temporarily impact above- and below-ground telephone, electrical, natural gas, water, and sewer lines and cables, potentially disrupting service to customers. Implementation of any of the action alternatives would require the existing irrigation system at the Memorial to be modified (new sprinklers). Over the long-term, there may be a decreased need for outside firefighting services at the Memorial due to a decreased potential for wildfires.

Resource Conservation: The NPS's *Guiding Principles of Sustainable Design* (NPS, 1995b) provides a basis for achieving sustainability in facility planning and design, emphasizes the importance of biodiversity, and encourages responsible decisions. The guidebook articulates principles to be used such as resource conservation and recycling. The effluent recycling system would contribute to water resources conservation and would allow the Memorial's freshwater supply to be reserved for potable uses. Therefore, this impact topic is evaluated in this EA.

Wilderness: Mount Rushmore National Memorial does not contain proposed or designated wilderness. However, the Black Elk Wilderness Area lies on the western border of the Memorial. The proposed effluent recycling system could potentially benefit wilderness by reducing the threat of wildfires through fire mitigation and suppression at the Memorial and in the surrounding area. Therefore, this impact topic is evaluated in this EA.

1.4.2 Impact Topics Considered but Dismissed From Detailed Analysis

NEPA and the CEQ Regulations direct agencies to "avoid useless bulk…and concentrate effort and attention on important issues" (40 CFR 1502.15). Certain impact topics that are sometimes addressed in NEPA documents on other kinds of proposed actions or projects have been judged to not be substantively affected by any of the alternatives considered in this EA. These topics are listed and briefly described below, and the rationale provided for considering them, but dropping them from further analysis.

Wetlands and Floodplains: Presidential Executive Orders 11988 and 11990, as well as the CWA and Rivers and Harbors Act, mandate floodplain management and protection of wetlands. None of the proposed activities would take place in Memorial wetlands, or have the potential to affect Memorial wetlands. The Memorial does not contain any floodplains. Therefore, these topics were dismissed from further analysis in this EA.

Transportation: None of the alternatives would result in increased traffic or congestion, or have the potential to result in road closures or damage. Therefore, this topic was dismissed from further analysis in this EA.

Threatened and Endangered Species: The Federal Endangered Species Act prohibits harm to any species of fauna or flora listed by the U.S. Fish and Wildlife Service (USFWS) as being either threatened or endangered. Such harm includes not only direct injury or mortality, but also disrupting the habitat on which these species depend. There are no known threatened or endangered species that reside within Mount Rushmore National Memorial, nor is there any critical habitat. Therefore, this impact topic is not included for further analysis in this EA.

Waste Management: None of the alternatives would have the potential to affect solid waste generation or management at the Memorial. Existing waste management practices and infrastructure would be maintained. Therefore, this impact topic is not further addressed in this EA. Please note that management of wastewater will be analyzed under the topic of *Water Resources* in this EA.

Land Use: Land use of the Memorial and surrounding area would not be directly impacted by installation of an effluent recycling system. Current land uses at the Memorial would continue regardless of which alternative is implemented. Therefore, land use is not further addressed in this EA.

Environmental Justice/Protection of Children: Presidential Executive Order 12898 requires Federal agencies to identify and address disproportionate impacts of their programs, policies and activities on minority and low-income populations. Executive Order 13045 requires Federal actions and policies to identify and address disproportionately adverse risks to the health and safety of children. None of the alternatives would have disproportionate health or environmental effects on minorities or low-income populations as defined in the U.S. Environmental Protection Agency's (USEPA) Environmental Justice Guidance; therefore, these topics are not further addressed in this EA.

Prime and Unique Agricultural Lands: Prime farmland has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. Unique land is land other than prime farmland that is used for production of specific high-value food and fiber crops. Both categories require that the land is available for farming uses. Lands within Mount Rushmore National Memorial are not available for farming and, therefore, do not meet these definitions. This impact topic is not evaluated further in this EA.

Indian Trust Resources: Indian trust assets are owned by Native Americans but held in trust by the United States. Indian trust assets do not occur within Mount Rushmore National Memorial. Therefore, are not evaluated further in this EA.

Table 1-1. Impact Topics for Mount Rushmore National Memorial Effluent Recycling System EA

Impact Topic	Retained or Dismissed from Further Evaluation	Relevant Regulations or Policies
Soils and Geology	Retained	NPS Management Policies 2001
Water Resources	Retained	CWA; Executive Order 12088; NPS Management Policies 2001
Vegetation	Retained	NPS Management Policies 2001
Wildlife	Retained	NPS Management Policies 2001
Air Quality	Retained	Federal CAA; CAA Amendments of 1990; NPS Management Policies 2001
Noise	Retained	NPS Management Policies 2001
Visual Resources	Retained	NPS Management Policies 2001
Visitor Use and Experience & Park Operations	Retained	NPS Management Policies 2001
Socioeconomics	Retained	40 CFR Regulations for Implementing NEPA; NPS Management Policies 2001
Human Health & Safety	Retained	NPS Management Policies 2001
Utilities/Public Services	Retained	NPS Management Policies 2001
Resource Conservation, Including Energy, and Pollution Prevention	Retained	NEPA; NPS Guiding Principles of Sustainable Design; NPS Management Policies 2001
Wilderness	Retained	The Wilderness Act; DO #41; NPS Management Policies 2001
Wetlands	Dismissed	Executive Order 11988; Executive Order 11990; Rivers and Harbors Act; CWA; NPS Management Policies 2001
Transportation	Dismissed	NPS Management Policies 2001
Threatened and Endangered Species and their Habitats	Dismissed	Endangered Species Act; NPS Management Policies 2001
Waste Management	Dismissed	NPS Management Policies 2001
Land Use	Dismissed	NPS Management Policies 2001
Environmental Justice	Dismissed	Executive Order 12898
Prime and Unique Agricultural Lands	Dismissed	CEQ's 1980 memorandum on prime and unique farmlands
Indian Trust Resources	Dismissed	Department of the Interior Secretarial Orders No. 3206 and No. 3175

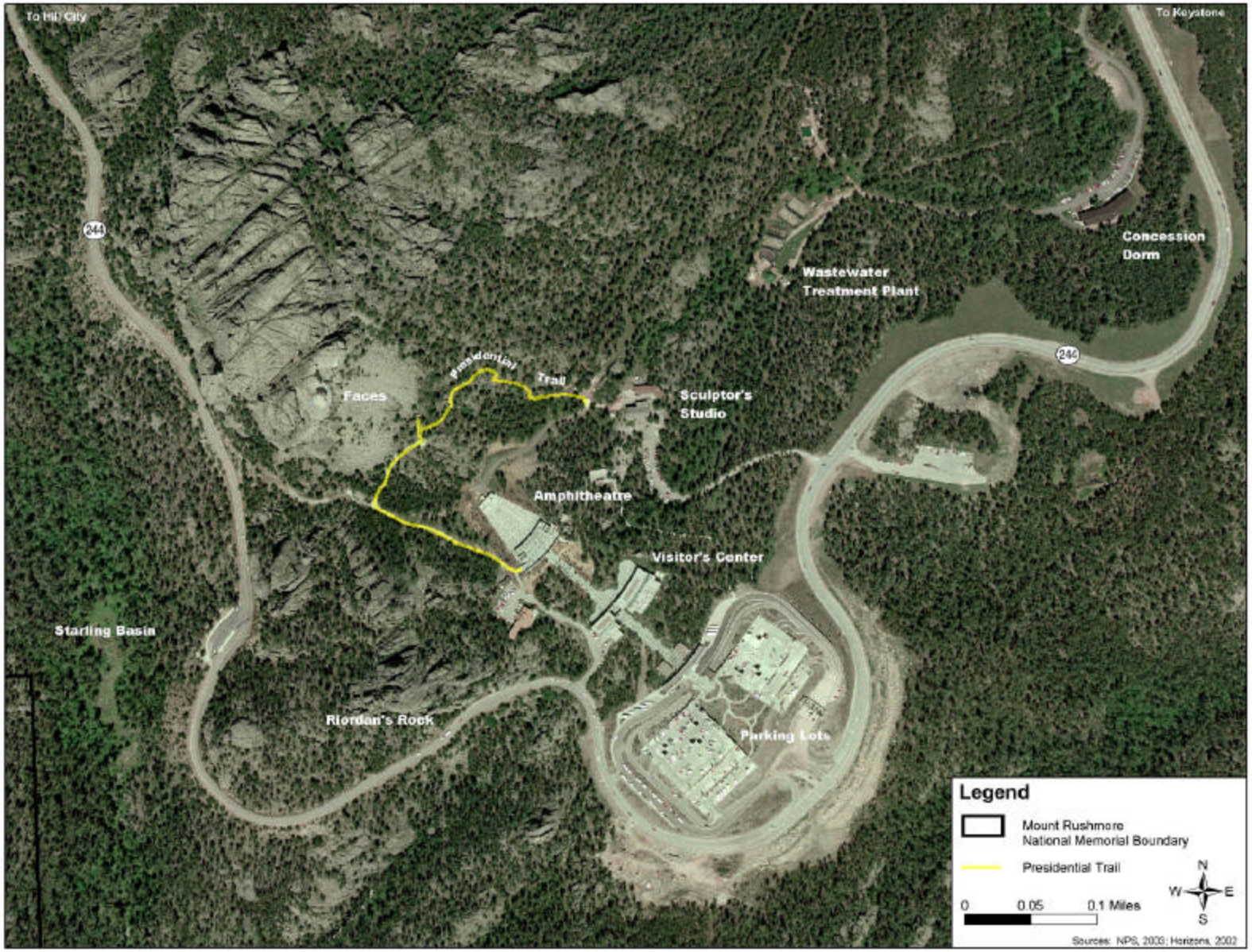

Figure 1-1. Mount Rushmore National Memorial Vicinity

CHAPTER 2
ALTERNATIVES

This chapter describes the range of alternatives, including the Proposed Action and No Action alternatives, formulated to address the purpose of and need for the proposed project. These alternatives were developed through evaluation of the comments provided by individuals, organizations, governmental agencies, and the interdisciplinary team.

2.1 ALTERNATIVES CONSIDERED AND ANALYZED IN THIS EA

2.1.1 Alternative 1: No Effluent Recycling (No Action)

Under the No Action alternative, the effluent discharged from the Memorial's wastewater treatment facility would not be stored and reused for any purpose. The wastewater would continue to be discharged into Lafferty Gulch. Grounds irrigation, vehicle and parking lot cleaning, and other operations at the Memorial would continue to use the Memorial's freshwater supply.

CEQ regulations (40 CFR 1502.14) require the assessment of the No Action alternative in NEPA documents. The No Action alternative provides a baseline against which to measure the impacts of the other proposed alternatives.

2.1.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Under Alternative 2, the NPS would implement an effluent recycling system at the Mount Rushmore National Memorial. Wastewater from the treatment facility would be stored in an aboveground storage tank for reuse under this alternative. The storage tank would have a capacity of 1.5 to 2 million gallons, and would either be constructed from pre-cast or cast-in-place concrete or steel. A concrete foundation would likely be needed to support the tank, and would require excavation at the site. The aboveground storage tank would be constructed within the existing wastewater treatment facility site, at the outlet of the wastewater treatment facility (in Lafferty Gulch). The height of the tank would be dependent on the tank's dimensions; a tank 50 feet wide and 50 feet long would be approximately 75 (for 1.5 million gallons) to 105 (for 2 million gallons) feet tall.

Treated wastewater effluent would be pumped from the treatment facility into the tank. Once the tank is filled, overflow from the tank would be discharged into Lafferty Gulch. The ultraviolet (UV) radiation equipment currently installed at the treatment facility would not be adaptable for concurrent routing of stored effluent for reuse. Instead, the recycling facilities would be designed to include dedicated UV disinfection equipment within the pumping system to treat the effluent (Foss, 2003a). The South Dakota DENR would require sampling of the storage tank contents prior to

effluent reuse and discharge into the receiving stream. Wastewater would be sampled for: total dissolved solids, electrical conductivity, pH, total suspended solids, biochemical oxygen demand, ammonia-nitrogen, total Kjeldahl nitrogen, nitrates, phosphorus, chlorides, sulfates, carbonates, bicarbonates, calcium, magnesium, sodium, fecal coliform, adjusted sodium adsorption ration, and percent sodium. Limits on fecal coliform would be more restrictive (10/100 mL) than that under the current permit to be protective of human health and the environment (Thunstrom, 2003a).

An underground main irrigation trunk line would be constructed from the wastewater storage tank, along existing utility corridors, and under the Presidential Trail. This main truck line would be installed permanently, and would connect to the existing underground irrigation system adjacent to each individual irrigation area (Presidential Parking, Orientation Center, Concession, and Visitor Center). The only change to the existing irrigation system would be replacing the sprinkler heads to those compatible for effluent use. The project would also include construction of a central pumping station and inline booster pumps. Temporary aboveground lines would be connected to the main trunk line for irrigation of additional areas and for fire suppression, when needed. These temporary lines would be removed and stored when not needed. Prior to the winter season, the tank and irrigation system would be emptied to prevent freezing. During draining, the wastewater would be slowly discharged into Lafferty Gulch.

In accordance with South Dakota DENR requirements, the effluent irrigation application rate would be controlled to prevent any surface runoff of the effluent. In no case would the application rate exceed ¼ inch per hour or 2 inches per acre per week. To prevent ground saturation and runoff, no application would be permitted during periods of heavy or prolonged rainfall, snow cover, or when the ground is frozen. All irrigation activities at the Memorial would occur during times when people are not present, such as in the early morning, evening, and nighttime (Thunstrom, 2003a).

Construction of the aboveground storage tank would require removal of vegetation from the site, primarily grasses and brush, but also a few trees. Construction would be planned to minimize ground disturbance and vegetation removal. Due to drainage patterns in the area, storm water would be diverted around the tank structure. Since some construction activities, such as excavation, pipe-laying, and concrete/steel construction, are weather-dependent, construction would intercede into the Park's traditional on-season periods. However, construction of the main irrigation trunk line under the Presidential Trail would occur during the off-season to minimize disturbance to visitors.

The NPS would regularly monitor the quality of wastewater stored in the tank for compliance with State standards and would report monitoring results to the DENR. In addition, the Memorial's Surface Water Discharge permit would need to be modified to incorporate the new outfall and recycling/irrigation process as a permanent part of its permitted wastewater treatment system. This permit modification may require additional monitoring and reporting, more restrictive limits for parameters such as fecal coliform (a limit of 10/100mL would apply), and any other limitations that would be protective of human health and the environment (Thunstrom, 2003a).

2.1.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Under Alternative 3, the NPS would implement an effluent recycling system at the Mount Rushmore National Memorial. Wastewater from the treatment facility would be stored in a lined surface reservoir for reuse under this alternative. The reservoir would have a capacity of 1.5 million gallons, and would be constructed within the existing wastewater treatment facility site, at the outlet of the wastewater treatment facility (in Lafferty Gulch). The exact dimensions of this reservoir are not yet known, and are partially dependent on the depth to bedrock; if additional depth is needed, the side berms of the reservoir would be built up with excavated material to accommodate more water.

Treated wastewater effluent would be pumped from the treatment facility into the reservoir. Once the reservoir is filled, overflow from the reservoir would be discharged into Lafferty Gulch. The ultraviolet (UV) radiation equipment currently installed at the treatment facility would not be adaptable for concurrent routing of stored effluent for reuse. Instead, the recycling facilities would be designed to include dedicated UV disinfection equipment within the pumping system to treat the effluent (Foss, 2003a). The DENR would require sampling of the reservoir contents prior to effluent reuse and discharge into the receiving stream. Wastewater would be sampled for: total dissolved solids, electrical conductivity, pH, total suspended solids, biochemical oxygen demand, ammonia-nitrogen, total Kjeldahl nitrogen, nitrates, phosphorus, chlorides, sulfates, carbonates, bicarbonates, calcium, magnesium, sodium, fecal coliform, adjusted sodium adsorption ration, and percent sodium. Limits on fecal coliform would be more restrictive (10/100 mL) than that under the current permit to be protective of human health and the environment (Thunstrom, 2003a). Water stored in the reservoir would be aerated to reduce the potential for algae build-up and other adverse effects.

An underground main irrigation trunk line would also be constructed under Alternative 3, using the same corridors and connections as described above for Alternative 2. This irrigation system would be operated in the same manner as described above, and would operate under the same restrictions from the South Dakota DENR.

Construction of the reservoir would require removal of vegetation from the site, primarily grasses and brush, but also a few trees. The construction footprint for Alternative 3 would be somewhat larger than that for Alternative 2, and would require deeper excavation. However, construction would still be planned to minimize ground disturbance and vegetation removal. Due to drainage patterns in the area, storm water would be diverted around the reservoir.

The NPS would regularly monitor the quality of wastewater stored in the reservoir for compliance with State standards and would report monitoring results to the DENR. In addition, the Memorial's Surface Water Discharge permit would need to be modified to incorporate the new outfall and recycling/irrigation process as a permanent part of its permitted wastewater treatment system. This permit modification may require additional monitoring and reporting, more restrictive limits for parameters such as fecal coliform (a limit of 10/100mL would apply), and any other limitations that would be protective of human health and the environment (Thunstrom, 2003a).

2.1.4 Environmentally Preferred Alternative

As stated in Section 2.7 (D) of the NPS DO-12 Handbook, "The environmentally preferred alternative is the alternative that will best promote the national environmental policy expressed in NEPA (Section 101(b))."

NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) SEC 101 GOAL STATEMENTS

(1) Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
(2) Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
(3) Attain the widest range of beneficial uses of the environment without degradation, risk to health and safety, or other undesirable and unintended consequences;
(4) Preserve important historic, cultural, and natural aspects of our national heritage, and maintain wherever possible, an environment which supports diversity and variety of individual choice;
(5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
(6) Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

(NEPA, 42 U.S.C. 4321-4347)

In sum, the environmentally-preferred alternative is the alternative that, not only results in the least damage to the biological and physical environment, but also that best protects, preserves, and enhances historic, cultural, and natural resources.

The approach for incorporating these national goal statements into the determination of the environmentally preferable alternative used a qualitative comparison rating of the alternatives under consideration. Each alternative assessed in this EA was rated as to how well it contributes to meeting each of the six NEPA goals. Given the very general nature of the goal statements, with no specific measurable parameters identified, precise, quantitative ratings are not feasible. Therefore, three general qualitative levels were established to rate alternatives as to how well they contribute to meeting each goal: 1) the alternative contributes substantially to meeting that goal (denoted by a check mark); 2) the alternative neither much contributes nor much detracts to meeting that goal (denoted by a circle); and 3) the alternative interferes with that goal achievement (denoted by an "X"). Each rating was judgmentally based on an alternative's predicted impacts on the relevant environmental resources. For example, an alternative that adversely affects historic, cultural, and natural resources would get a low rating in regard to NEPA goal #4. Although more than one alternative may contribute substantially towards meeting a goal, one may contribute to a greater level than another. In these cases, the use of multiple check marks denotes the difference between alternatives, with the larger number of check marks indicating the greater level of goal achievement.

A summary of this process for each alternative is presented in **Table 2-1**. Identification of the environmentally preferred alternative involved comparing the entire set of ratings for each

alternative. In the absence of any indication of Congressional intent otherwise, each of the six NEPA goal statements was considered equally important.

Table 2-1. Selection of the Environmentally-Preferred Alternative

National Environmental Policy Act Goals	Alternative 1: No Action	Alternative 2: Aboveground Storage Tank	Alternative 3: Open Reservoir
Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	**O**	Ö	Ö
Assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings.	**X**	Ö	Ö
Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.	**O**	Ö	Ö
Preserve important historic, cultural, and natural aspects of our national heritage, and maintain, whenever possible, an environment that supports diversity, and variety of individual choice.	**O**	**O**	**O**
Achieve a balance between population and resource use, which will permit high standards of living and a wide sharing of life's amenities.	**O**	Ö	Ö
Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.	**X**	Ö	Ö

Legend:
Contributes substantially to meeting the goal = Ö
Neither much contributes nor much detracts to meeting the goal = O
Interferes with that goal achievement = **X**

As demonstrated in **Table 2-1**, Alternatives 2 and 3 best meet goals 1, 2, 3, 5, and 6. However, Alternative 2 is the environmentally preferred alternative because it would cause the least damage to the biological and physical environment on the Memorial and would benefit current and future visitors by conserving water supply and protecting resources from wildfire.

2.2 ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

CEQ regulations for implementing NEPA require that Federal agencies explore and objectively evaluate all reasonable alternatives to the Proposed Action, and to briefly discuss the rationale for eliminating any alternatives that were not considered in detail.

An alternative of constructing an effluent storage reservoir at the site of the Indian Camp to the east of the monument was considered. This site was considered a possibility for a large reservoir due to non-prohibitive grades and proximity to the monument. There is also a large amount of vegetative debris and fuels in the area. However, this site was eliminated from further consideration as a storage location alternative due to the potential for alteration of the cultural landscape at the Memorial.

2.3 MITIGATION MEASURES AND MONITORING

Mitigation measures are implemented to prevent and/or mitigate potential adverse environmental impacts that may occur from proposed activities. The following mitigation measures would be implemented as part of the action to be taken, and are common to all action alternatives.

Soils and Geology

- The NPS would require that the construction contractor stage all heavy equipment on the paved parking area of the dormitory to minimize soil compaction.
- The NPS would require the construction contractor to avoid the use of heavy equipment when soils are wet, such as after a storm event.
- Storm water runoff would be diverted from disturbed areas during construction, and other structural controls, such as silt fencing, would be used to intercept sediment in runoff before draining into Lafferty Gulch or other receiving streams.
- The NPS would require that, upon completion of construction, all disturbed areas would be reseeded with native vegetation.

Vegetation and Wildlife

- The NPS would require mitigation specifications to control fuel and equipment storage and handling for the project. All fuel and hazardous material storage would be restricted to areas away from any surface water resource. All fuel or chemical spills would be required to be cleaned up in accordance with U.S. Environmental Protection Agency (USEPA) and Occupational Safety and Health Administration (OSHA) regulations.

Water Resources

- Prior to the start of construction, the construction contractor must prepare a Pollution Prevention Plan to obtain a storm water permit from the DENR. The plan must describe how runoff and pollution will be controlled/reduced during and after construction.
- See *Soils and Geology* mitigation measures above.

Noise

- The NPS would require the construction contractor to conduct the majority of main trunk line construction activities (particularly those nearest visitor use facilities) during periods of low visitation at the Memorial (end of September to early April), when few visitors are present on the Presidential Trail, and when the Sculptor's Studio is closed to visitation.
- The NPS would ensure that any noise-generating permanent equipment is located away from visitor use areas and is inaudible at such areas.

Visitor Use and Experience

- The NPS would divert visitors using the portion of Presidential Trail undergoing construction to ensure that visitors have access to all the Park facilities at any given time.
- See *Noise* mitigation measures above.

Human Health and Safety

- The NPS would require the construction contractor to install barricades or fences around the construction sites to prevent non-contractors and the public from entering the areas. These barricades would be regularly maintained and would be illuminated at night. The NPS would also require the contractor to post warning signs to notify employees and the public of the construction site and dangers at the sites. All required signage per the *Manual on Uniform Traffic Control Devices* would be installed and maintained around the construction sites and along the road to the wastewater treatment facility.
- The NPS would require the contractor to place orange fencing around any open trench during installation of the main trunk line. Any excavated trenches would be refilled with excavated soil immediately following the placement of the pipe in the trench. No trenches would be left exposed overnight.
- The NPS would require that the majority of water line installation activities occur during off-peak months at the Memorial, particularly during installation under the Presidential Trail.
- The NPS would close the portion of the Trail undergoing construction at any given time to visitors, and would divert visitors around the construction.
- The NPS would include NPS safety standards as part of the construction contract.
- The NPS would require the contractor to store all fuel, construction materials, and equipment away from any surface water resource. In the event of an accidental spill, the NPS would require the contractor to contact the Park, which would then contact hazardous material cleanup contractors. All fuel or chemical spills would be required to be contained and cleaned up in accordance with USEPA and OSHA regulations.
- If the reservoir were to be constructed up to the road under Alternative 3, the NPS would construct a fence or railing along the side of the road between the road surface and the reservoir. In addition, the NPS would post signage noting the presence of the open reservoir, and restricting public access.

Utilities

- The NPS would require the construction contractor to consult and coordinate with the local utility company and utility maps prior to installing underground pipelines at the Memorial.

2.4 COMPARISON OF ALTERNATIVES

Table 2-2 briefly summarizes the environmental effects of the various alternatives. It provides a quick comparison of how well the alternatives respond to the project need, objectives, important issues and key resources. Chapter 3 discusses the environmental consequences of the proposed alternatives in detail.

Table 2-2. Comparison of Potential Impacts of the Alternatives			
Key Resources	**Alternative 1: No Action**	**Alternative 2: Store Effluent in Aboveground Storage Tank for Reuse**	**Alternative 3: Store Effluent in Open Reservoir for Reuse**
Soils & Geology	• No impacts on soils or geology anticipated	• Short-term, localized, negligible to minor impacts on soils due to soil disturbance, compaction, erosion, stockpiling, & removal of vegetation during construction if mitigation measures are used • Long-term, localized, minor impacts on soils due to soil excavation & removal of vegetation at the aboveground storage tank site	• Short-term, localized, negligible to minor impacts on soils due to soil disturbance, compaction, erosion, stockpiling, & removal of vegetation during construction if mitigation measures are used • Long-term, localized, moderate impacts on soils & geology due to soil & bedrock excavation & removal of vegetation at the reservoir site • Short-term to long-term, minor to moderate (depending on intensity of explosion), localized, adverse impacts on geology from blasting
Water Resources	• Long-term, moderate, localized impacts on freshwater resources & water quality due to continued discharge of effluent into Lafferty Gulch • Long-term potential for freshwater shortage at the Memorial during periods of drought • Negligible potential for contamination of surface water resources from continued effluent discharge	• Short-term, negligible to minor, localized, adverse impacts on water resources during construction with implementation of mitigation measures due to ground-disturbing activities & associated erosion & sediment • Negligible potential for a fuel/chemical spill to occur & adversely affect water resources • Long-term, moderate, localized impacts on water resources during operation of the recycling system due to changes in hydrology of Lafferty Gulch • Long-term, negligible to moderate, localized benefits to water resources from operation of the recycling system due to reduction in freshwater use & the potential for shortages, water quality improvements from the reduction of effluent discharge into Lafferty Gulch	• Short-term, negligible to minor, localized, adverse impacts on water resources during construction with implementation of mitigation measures due to ground-disturbing activities & associated erosion & sediment • Negligible potential for a fuel/chemical spill to occur & adversely affect water resources • Long-term, moderate, localized impacts on water resources during operation of the system due to changes in hydrology of Lafferty Gulch • Alternative would require a permit from the U.S. Army Corps of Engineers to authorize dam construction in a navigable water of the U.S. pursuant to Section 9 of the Rivers & Harbors Act & Section 404 of the CWA, as amended • Long-term, negligible impacts from wildlife contamination of the surface reservoir • Long-term, negligible to moderate, localized benefits to water resources from operation of the recycling system due to reduction in freshwater use & the potential for shortages, water quality improvements from the reduction of effluent discharge into Lafferty Gulch

Table 2-2. Comparison of Potential Impacts of the Alternatives			
Key Resources	**Alternative 1: No Action**	**Alternative 2: Store Effluent in Aboveground Storage Tank for Reuse**	**Alternative 3: Store Effluent in Open Reservoir for Reuse**
Vegetation & Wildlife	• No impacts on vegetation or wildlife anticipated	• Short-term, negligible to minor, localized, adverse impacts on vegetation & wildlife during construction due to removal or disturbance of vegetation, presence of workers, & noise associated with equipment use • Negligible potential for a fuel or chemical spill to occur & adversely affect vegetation or wildlife • Short-term, negligible to minor, adverse impacts on riparian vegetation & animals in Lafferty Gulch from reduction in water flow • No new impacts on vegetation from irrigation • Long-term, negligible to minor potential for increased vegetation growth from fire suppression activities around Memorial • Long-term, beneficial impacts on vegetation & wildlife due to a reduction in the potential for a catastrophic wildfire to occur & destroy area vegetation & habitats	• Short-term, negligible to minor, localized, adverse impacts on vegetation & wildlife during construction due to removal or disturbance of vegetation, presence of workers, & noise associated with equipment use • Negligible potential for a fuel or chemical spill to occur & adversely affect vegetation or wildlife • Short-term, negligible to minor, adverse impacts on riparian vegetation & animals in Lafferty Gulch from reduction in water flow • No new impacts on vegetation from irrigation • Long-term, negligible to minor potential for increased vegetation growth from fire suppression activities around Memorial • Long-term, beneficial impacts on vegetation & wildlife due to a reduction in the potential for a catastrophic wildfire to occur & destroy area vegetation & habitats • No potential for effluent quality to adversely affect wildlife • Long-term, negligible to minor, adverse impact from the potential to attract additional wildlife to the reservoir & alter the natural ecosystem & populations
Air Quality	• No impacts on air quality anticipated	• Short-term, negligible, adverse impacts on air quality from equipment emissions & fugitive dust during construction • Long-term, minor, adverse impacts on air quality from emissions of new pumping system • Long-term, beneficial impacts on air quality from reducing the potential for a catastrophic fire to occur & improving	• Short-term, negligible, adverse impacts on air quality from equipment emissions & fugitive dust during construction • Impacts from fugitive dust during construction would be greater than under Alternative 2 • Long-term, minor, adverse impacts on air quality from emissions of new pumping system • Long-term, beneficial impacts on air quality from

Table 2-2. Comparison of Potential Impacts of the Alternatives			
Key Resources	**Alternative 1: No Action**	**Alternative 2: Store Effluent in Aboveground Storage Tank for Reuse**	**Alternative 3: Store Effluent in Open Reservoir for Reuse**
		the fire suppression capabilities in the event of a fire	reducing the potential for a catastrophic fire to occur & improving the fire suppression capabilities in the event of a fire
Noise	• No noise impacts anticipated	• Short-term, negligible to minor, localized, adverse impacts on noise levels during construction of storage tank • Short-term, moderate, adverse impacts on noise levels during construction of main trunk line • Construction noise would cause short-term disruption and/or disturbance of wildlife & visitors • Long-term, minor noise impacts due to operation of new irrigation system	• Short-term, negligible to minor, localized, adverse impacts on noise levels during construction of storage reservoir • Short-term, moderate, adverse impacts on noise levels during construction of main trunk line • Construction noise would cause disruption and/or short-term disturbance of wildlife & visitors • Long-term, minor noise impacts due to operation of new irrigation system
Visual Resources	• Short- to long-term, minor to major, adverse impacts on visual quality in the event of a fire	• Short-term, minor to moderate impacts on visual quality from construction due to the presence of workers, equipment, materials, & the construction sites • No long-term impacts on visual quality at visitor facilities • Long-term, moderate, adverse impacts on visual quality in the area of the wastewater treatment plant • Recurring, short-term, minor, adverse impacts on visual resources at the Park due to the presence of temporary distribution lines	• Short-term, minor to moderate impacts on visual quality from construction due to the presence of workers, equipment, materials, & the construction sites • No long-term impacts on visual quality at visitor facilities • Long-term, minor to moderate, adverse impacts on visual quality in the area of the wastewater treatment plant • Recurring, short-term, minor, adverse impacts on visual resources at the Park due to the presence of temporary distribution lines
Visitor Use & Experience (including Park Operations)	• No direct impacts on or changes in recreational or visitor use opportunities or Park operations • Potential for long-term,	• Short-term, minor to moderate, adverse impacts on visitor use & experience during construction due to noise & the presence of & diversion around the construction site if mitigation measures are implemented	• Short-term, minor to moderate, adverse impacts on visitor use & experience during construction due to noise & the presence of & diversion around the construction site if mitigation measures are implemented

Table 2-2. Comparison of Potential Impacts of the Alternatives			
Key Resources	**Alternative 1: No Action**	**Alternative 2: Store Effluent in Aboveground Storage Tank for Reuse**	**Alternative 3: Store Effluent in Open Reservoir for Reuse**
	moderate, adverse impact on visitor use & experience & Park operations & facilities, particularly in the event of a fire, due to inadequate water supply • Short to long-term, minor to moderate, adverse impacts on Park operations, & subsequently on visitor use & experience, due to insufficient freshwater	• No adverse impacts on visitor use & experience over the long-term • Long-term, beneficial impacts on visitor use & experience, Park facilities, & Park operations due to preservation of freshwater supplies, provision of sufficient water supply for fire management activities, & a decrease in the risk of damage to important visitor use buildings	• No adverse impacts on visitor use & experience over the long-term • Long-term, beneficial impacts on visitor use & experience, Park facilities, & Park operations due to preservation of freshwater supplies, provision of sufficient water supply for fire management activities, & a decrease in the risk of damage to important visitor use buildings
Socioeconomics	• Costs associated with pumping & use of freshwater would continue to be incurred by NPS under current patterns & fluctuations • No short-term effects on socioeconomic resources • Long-term, adverse socioeconomic impacts due to potential for insufficient freshwater resources to be available for Park operations & daily activities, limiting services provided & altering visitation & direct spending by visitors • Long-term potential for adverse socioeconomic impacts in the event of a	• Short-term, negligible to minor, beneficial impacts on the local economy from construction • Short-term, minor, adverse economic impact incurred by NPS due to cost of tank installation • Long-term, localized, beneficial socioeconomic impacts due to reduced risk of catastrophic fire & potential for adverse effects on property & Park operations • Long-term, negligible, beneficial economic impact due to NPS savings from reduced freshwater use • Long-term, moderate, adverse economic impact due to costs associated with maintenance of the recycling system • No major adverse social impacts	• Short-term, negligible to minor, beneficial impacts on the local economy from construction • Short-term, minor, adverse economic impact incurred by NPS due to cost of reservoir construction; impact less than Alternative 2 • Long-term, localized, beneficial socioeconomic impacts due to reduced risk of catastrophic fire & potential for adverse effects on property & Park operations • Long-term, negligible, beneficial economic impact due to NPS savings from reduced freshwater use • Long-term, moderate, adverse economic impact due to costs associated with maintenance of the recycling system • No major adverse social impacts

Table 2-2. Comparison of Potential Impacts of the Alternatives			
Key Resources	**Alternative 1: No Action**	**Alternative 2: Store Effluent in Aboveground Storage Tank for Reuse**	**Alternative 3: Store Effluent in Open Reservoir for Reuse**
	fire due to displacement of employees, disruption of jobs, loss of property, temporary displacement and/or disruption of the operational work functions & management of the Park, & monetary costs incurred by the NPS as a result of a fire; intensity & duration of impacts would depend on severity & location of the fire		
Human Health & Safety	• No direct effects on human health & safety • Potential for long-term, moderate to major threats to human health & safety in the event of a fire due to inadequate fire suppression	• Short-term, negligible to minor, adverse impacts on worker & public safety during construction with implementation of safety measures • Negligible potential for an accidental fuel or chemical spill to occur & adversely affect human health & safety • No adverse impacts on human health & safety from use of wastewater effluent in the irrigation system • No adverse impacts on public health & safety at the wastewater treatment facility & storage site • Long-term, beneficial, indirect impacts on human health & safety from reducing the potential for: the Memorial's fresh-water supply to be depleted, loss of life & property & the need for rescues during fire events, & for a catastrophic wildfire to occur on & threaten visitors &	• Short-term, negligible to minor, adverse impacts on worker & public safety during construction with implementation of safety measures • Negligible potential for an accidental fuel or chemical spill to occur & adversely affect human health & safety • No adverse impacts on human health & safety from use of wastewater effluent in the irrigation system • No adverse impacts on public health & safety at the wastewater treatment facility & storage site • Long-term, beneficial, indirect impacts on human health & safety from reducing the potential for: the Memorial's freshwater supply to be depleted, loss of life & property & the need for rescues during fire events, & for a catastrophic wildfire to occur on & threaten visitors & employees at the Memorial, & on adjacent lands • Long-term, potential for minor adverse impacts on human health & safety from presence of open

Table 2-2. Comparison of Potential Impacts of the Alternatives			
Key Resources	**Alternative 1: No Action**	**Alternative 2: Store Effluent in Aboveground Storage Tank for Reuse**	**Alternative 3: Store Effluent in Open Reservoir for Reuse**
		employees at the Memorial, & on adjacent lands	reservoir
Cultural Resources	• No direct effects on cultural resources • Potential for long-term, moderate to major threats to historic properties in the event of a fire due to inadequate fire suppression capabilities	• No adverse effects on & no impairment of cultural resources • Long-term, indirect, beneficial impacts on cultural resources due to decreased potential for loss or irreparable damage to historic buildings within the Memorial from improved fire suppression capabilities	• No adverse effects on & no impairment of cultural resources • Long-term, indirect, beneficial impacts on cultural resources due to decreased potential for loss or irreparable damage to historic buildings within the Memorial from improved fire suppression capabilities
Utilities & Public Services	• No impacts on any telephone, power, fiber optic, sewer, or other utility lines • Adverse impacts on utilities due to potential for damage to Park infra-structure, including utilities, in the event of a catastrophic fire; intensity & duration of impact dependent on severity & location of fire • Potential for recurrent short-term, minor to moderate, adverse impacts associated with freshwater shortages • Short-term, minor to moderate, adverse impacts on public services due to decreased effectiveness & efficiency	• Alternative consistent with NPS Management Policies for utility lines • Short-term, negligible potential for adverse impacts on utilities during construction • No long-term adverse impacts on utilities • Long-term, moderate, beneficial impacts on utilities due to eliminating potential for the demand for water to be greater than the supply, particularly during emergency fire situations • Long-term, minor to moderate, beneficial impacts on public services due to in-creased efficiency & effectiveness of fire personnel efforts in the event of a fire	• Alternative consistent with NPS Management Policies for utility lines • Short-term, negligible potential for adverse impacts on utilities during construction • No long-term adverse impacts on utilities • Long-term, moderate, beneficial impacts on utilities due to eliminating potential for the demand for water to be greater than the supply, particularly during emergency fire situations • Long-term, minor to moderate, beneficial impacts on public services due to increased efficiency & effectiveness of fire personnel efforts in the event of a fire

Table 2-2. Comparison of Potential Impacts of the Alternatives			
Key Resources	**Alternative 1: No Action**	**Alternative 2: Store Effluent in Aboveground Storage Tank for Reuse**	**Alternative 3: Store Effluent in Open Reservoir for Reuse**
	of fire personnel in event of a fire		
Resource Conservation	• Continued long-term, moderate, localized, adverse impacts on the Park's freshwater supply • Potential for freshwater shortages in the future where extraction may exceed recharge • Alternative not consistent with NPS's Sustainable Design Initiative	• Long-term, moderate, localized benefits to the Park's freshwater supply • Long-term, indirect, beneficial impacts on cultural resources and Park facilities • Alternative consistent with NPS's Sustainable Design Initiative	• Long-term, moderate, localized benefits to the Park's freshwater supply • Long-term, indirect, beneficial impacts on cultural resources and Park facilities • Alternative consistent with NPS's Sustainable Design Initiative
Wilderness	• No direct effects on wilderness • Potential for long-term threats to the Black Elk Wilderness Area in event of a fire due to inadequate fire suppression capabilities; impact intensity dependent on severity & location of fire	• No direct effects on wilderness • Long-term, beneficial, indirect & cumulative impacts on the Black Elk Wilderness Area from reducing the potential for a catastrophic wildfire to occur on & threaten the Black Elk Wilderness Area	• No direct effects on wilderness • Long-term, beneficial, indirect & cumulative impacts on the Black Elk Wilderness Area from reducing the potential for a catastrophic wildfire to occur on & threaten the Black Elk Wilderness Area

CHAPTER 3
ENVIRONMENTAL ANALYSIS

This chapter summarizes the existing environmental conditions and the probable environmental consequences (effects) of implementing the action and No Action alternatives. This chapter also provides the scientific and analytical basis for comparing the alternatives. The probable environmental effects are quantified where possible; where not possible, qualitative descriptions are provided.

3.1 METHODOLOGY

The interdisciplinary study team followed a structured process to analyze the potential environmental impacts, or effects, resulting from the Proposed Action and its alternatives. This process, called the cause-effects-questions process, is described below.

Causes-Effects-Questions:
A Structured Analytic Process

Step 1: Identify the specific activities, tasks, and subtasks involved in the proposed action(s) and alternative(s).

Step 2: For each specific activity, task, and subtask, determine the full range of direct effects that each could have on any environmental resource. For example, removing vegetation could cause soil erosion.

Step 3: For each conceivable direct effect, identify which further effects could be caused by the direct effects. For example, soil erosion could cause stream sedimentation, which could kill stream species, which could diminish the food supply for fish, leading to decreased fish populations. This inquiry can identify multi-stepped chains of potential causes-and-effects.

Step 4: Starting at the beginning of each chain of causes-and-effects, work through a series of questions for each potential effect:

- Would this effect actually occur from this project?
  If not, why not? What would preclude it from happening?
- If the effect cannot be ruled out, characterize which types of data, other information, and analyses are needed to determine the parameters of the effect, including its extent, duration, and intensity. Identify the sources from which the data is to be obtained.

Step 5: Gather the data and conduct the analyses identified by the above steps. Gather and use only relevant information. Focus on getting sound answers to the impact questions.

Step 6: Document the results of this study process. Provide all relevant analytic information, but no extraneous encyclopedia bulk.

Using this process, both direct and indirect effects that could potentially occur as a result of the Proposed Action and its alternatives were identified. Direct effects are impacts caused by the alternative(s) at the same time and in the same location as the action. Indirect effects are impacts caused by the alternative(s) that occur later in time or farther in distance than the action.

The study team proceeded to conduct the investigation and analyses by gathering the data they concluded were relevant for each resource area. Using this datum, the team determined which impacts would occur and assessed them according to their duration, extent, intensity, and whether or not the impact would cause impairment in the Park's resources. These parameters are defined below. Potential mitigation measures were also identified and analyzed to reduce or avoid potential adverse impacts resulting from the project (see Section 2.2 of this EA).

3.1.1 Impact Definitions

Standardized impact definitions taken from the NPS *Sample Impact Threshold Definitions and Methodology Sections* (NPS, 2002b) were used to classify the impacts resulting from the Proposed Action and its alternatives. These impact definitions are resource-specific, and take into account the duration, extent, and intensity of an impact. These impact definitions are presented by resource area in Appendix A of this EA.

3.1.2 Impairment of Park Resources

The study team analyzed whether impacts would result in an impairment of Park resources based on guidelines set forth in *NPS Management Policies* (NPS, 2000b). Impairment occurs when an impact degrades or harms the integrity of Park resources or values, including opportunities that would otherwise normally be available for the enjoyment of those resources or values had the impact not occurred. Under the NPS Organic Act and the General Authorities Act, impairment of Park resources is prohibited.

NPS Management Policies outline the conditions under which an impact would be likely to result in an impairment of Park resources. According to the Policies, an impact would likely create an impairment to the extent that the conservation of the affected resource or value is: 1) essential to fulfill a purpose established in the enabling legislation or proclamation of the Park; 2) key to the integrity (natural or cultural) of the Park or its opportunities, or 3) identified as a goal in the general management plan for the Park. If an impact is an unavoidable result of an action required to maintain or restore the integrity of Park resources or values, and cannot be reasonably mitigated, the impact would be less likely to constitute an impairment of Park resources (NPS, 2000b).

3.1.3 Cumulative Impacts

A cumulative impact is an impact on the natural or human environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency, organization, or person undertakes such other actions (40 CFR 1508.7). Cumulative impacts can result from individually minor and insignificant, but collectively significant actions, taking place over a period of time.

Cumulative impacts were assessed by combining the potential environmental impacts of the alternatives with the potential impacts of known projects that have occurred in the past, are

currently occurring, or are projected to occur in the future within the region of the Proposed Action. Known past, current, and reasonably foreseeable future projects and actions in the vicinity of the project site are described below.

Prior to European settlement, the Mount Rushmore National Monument area underwent frequent, low-severity ground fires, which removed ground fuels. With the establishment of the Black Hills Forest Reserve over a century ago, a fire suppression policy was adopted, and wildland fire frequency decreased. An increased density of pine stands and abundant ladder fuels (e.g., dead and dry lower limbs, small trees) has resulted from suppression activities, which creates ideal conditions for high severity wildfires. Due to this threat, the Memorial recently approved its revised and updated Fire Management Plan (December 2002), which calls for the suppression of all naturally ignited and man-made wildfires, and allows for proactive efforts to help reduce the current high fire risk to the Memorial through expansions in the Memorial's thinning and prescribed fire programs. A majority of past and on-going thinning activities have been conducted along the road corridor and adjacent to visitor use areas. Under the expanded fire management program, additional thinning treatments will first be conducted in forest stands near the Memorial boundaries, especially near Keystone, and within approximately 1,500 feet of the sculpture. The Memorial will also employ prescribed fire in previously thinned areas to reduce hazardous fuels and to restore the natural fire regime to the ponderosa pine forests (NPS, 2002a).

Since 1925, developmental activities, including road and trail construction, visitor use structures, and administrative facilities, have occurred on the Memorial to provide for visitor services and access. Over the past ten years, Mount Rushmore facilities have undergone major redevelopment. In 1998, major construction of a 3-level parking facility, a larger amphitheatre and visitors center, amphitheatre access road, and a concession complex was completed on the Memorial. In 1990 and again in 1998, construction has occurred on South Dakota Highway 244, which resulted in its straightening and rerouting. In addition, construction of a new wastewater treatment facility on the Memorial was completed in 2002. While these development activities have enhanced visitor use and experience at the Memorial, disturbance of the natural vegetative cover and erosion has occurred in some areas and non-native/exotic species have increased. The NPS plans to restore these areas in the future, with restoration occurring on a target acreage annually (NPS, 2000a).

Beginning in 1998, the Memorial introduced a July 4th fireworks program, which has occurred annually with the exception of 2002 (due to high fire danger). Numerous wildfires have started on the Memorial as a result of the fireworks programs; however, all of the fires were quickly suppressed and, in total, burned no more than 2 acres.

The Mount Rushmore National Memorial receives approximately 3 million visitors annually. Most visitors remain at the Memorial for short-day periods. Visitor use is highest during the months of May through September, with approximately 25,000 to 30,000 visitors on peak days. July is the most popular month, with the July 4th Holiday fireworks program alone attracting an attendance of over 30,000 people to the Memorial. Visitation to the Memorial is anticipated to continue at current levels and patterns.

3.2 SOILS AND GEOLOGY

3.2.1 Affected Environment

Mount Rushmore National Memorial is located along the northeast edge of the Harney Peak granite batholith in the Black Hills of South Dakota. Harney Peak granite (of which Mount Rushmore is carved) consists of fine-grained minerals, including quartz, feldspar, muscovite, and biotite. It is believed that these minerals formed approximately eight miles below the earth's surface from molten magma. Some cracks developed as a result of the cooling of the magma and were later "patched" with molten magma. The result was the emplacement of pegmatite dikes that filled the fractures and zones of weakness in the granite. Today, these pegmatite dikes are expressed as white streaks on the foreheads of Presidents Washington and Lincoln (NPS, 2003a).

The soils within the Memorial are made up of two different types: Pactola-Rock Outcrop and Buska-Mocmont Rock Outcrop. The Pactola-Rock Outcrop soil type is found in the northern portion of the Memorial and the Buska-Mocmont-Rock Outcrop soil type is found in the southern portion. They are both well-drained, gently sloping to very steep, loamy soils. Pactola-Rock Outcrop is formed in material weathered from steeply tilted metamorphic rock. Buska-Mocmont-Rock Outcrop is formed in material weathered from micaceous schist and granite. Because of the slow breakdown of quartz and the large granite crystals, the soils tend to be thin (USGS-NPS, 2003).

Within the project area, soils consist of micaceous silty sand with some variations of sandy silt and sandy clay. In general, the soil depth is approximately 12 inches or less. Weathered to hard bedrock is present below the thin soil layer (AET, 2003).

Development activities to provide for visitor access and services at the Memorial have resulted in soil disturbance around the Park. Some disturbed sites have been reseeded with native and exotic grasses and forbs to provide immediate ground cover and reduce the incidence of erosion. Current efforts focus on erosion control and planting native vegetation, such as grasses and ponderosa pine. The NPS has developed a rehabilitation plan, which includes inventorying and mapping disturbed sites, replacing lost topsoil in areas worn to bedrock, and revegetation with native plants (NPS, 2000a).

3.2.2 Environmental Consequences

3.2.2.1 Alternative 1: No Action

Under Alternative 1, there would be no reuse of effluent discharged from the wastewater treatment facility, and there would be no associated construction activities that would impact soils or geology. Existing soil and geological conditions at the Memorial would continue.

3.2.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Construction associated with the installation of an aboveground 1.5 to 2-million-gallon tank would result in long-term, localized, minor impacts on soils due to soil excavation, compaction, removal of vegetation, and concrete placement for structural support. Construction of the permanent underground main irrigation trunk line would result in short-term, localized, minor, adverse impacts on soils due to soil disturbance.

Project construction would occur over a period of about 6 months from mid-spring to mid-fall. The aboveground tank would be constructed within the existing wastewater treatment facility site downstream of the current wastewater discharge outflow. Construction of the aboveground tank would disturb an area of approximately 2,500 square feet and would require removal of vegetation from the site, primarily grasses and brush, but also a few trees. Construction would be planned to minimize ground disturbance and vegetation removal.

A concrete foundation would likely be needed to support the tank, and would require excavation at the site. Excavation would cause permanent soil removal and displacement. Excess excavated soil may be used for fill material for future Park projects. A concrete foundation would also permanently cover any remaining soil not excavated. Blasting may or may not be required for excavation under this alternative. Impacts from blasting are discussed in detail in Section 3.2.2.3 below.

The project would also include construction of a central pumping station and inline booster pumps. The construction of underground main irrigation trunk line, central pumping station, and two inline booster pumps, would require additional ground disturbance. However, the trunk line would be constructed along existing utility corridors and the Presidential Trail, minimizing soil disturbance.

Soil compaction can occur from the use of heavy equipment during construction activities, where vehicle traffic compresses the upper soil layers, decreasing the aeration porosity and increasing the bulk density of the underlying soil. These effects limit the ability of soils to absorb moisture, store nutrients, and support plant growth. Compaction increases the impermeability of the soil, which could contribute to short-term increased surface water runoff from the project site, and subsequent increases in erosion and sedimentation. Soil compaction can also impede root growth, inhibiting revegetation. The extent of soil compaction depends on a variety of factors, including the soil type, soil moisture content, weight and type of vehicles used, proportion of the area that receives vehicular traffic, and the number of vehicle passes. Soil compaction is greatest when activities occur over moist soils. To minimize the potential impacts of soil compaction from use of heavy equipment, equipment will be staged on the paved parking area of the dormitory, located in the vicinity of the construction site, and construction would be avoided when soils are wet, such as after a storm event.

Exposed soils from construction, including soils stockpiled from excavation, are vulnerable to erosion during rainfall, and especially so during intense storms. The potential for this impact to occur would be greater in the areas of greater incline, resulting in an increase in surface water runoff velocity, and thus, a greater potential for soil erosion and sedimentation. Increased

surface water runoff and soil erosion could also result from the removal of vegetation in the area of the aboveground tank. Vegetation provides erosion control by increasing infiltration and providing soil stabilization. However, only a few trees would be removed during construction at this site, and all vegetation outside the footprint of the tank would be retained.

As discussed in detail under Section 3.3, the construction contractor would need to obtain a general storm water permit from the South Dakota DENR for any construction activity that disturbs one or more acres. As part of this permit, a Pollution Prevention Plan must be developed. The plan must give descriptions of how runoff will be controlled and pollution reduced during and after construction. Implementation of erosion and sediment controls would be aimed to minimize any adverse impacts on soils. Storm water runoff would be diverted from disturbed areas, minimizing sediment transport. Other structural controls, such as silt fencing, would be used to intercept sediment in runoff before draining into Lafferty Gulch.

Upon completion of construction, all disturbed areas would be reseeded with native vegetation to minimize erosion, promote soil stabilization, and avoid long-term adverse impacts on soils. Therefore, impacts on soils as a result of disturbance would be short-term and negligible in intensity.

3.2.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Under Alternative 3, the effluent would be stored in a lined surface reservoir with a capacity of 1.5 million gallons. An underground main irrigation trunk line would be constructed from the reservoir, along existing utility corridors, and under the Presidential Trail. The reservoir would be located in the same area as the aboveground tank discussed under Alternative 2 above. The exact dimensions of the reservoir are not yet known, and are partially dependent on the depth to bedrock. Construction of the open reservoir would require a larger area of disturbance than Alternative 2, as discussed below. Long-term, localized, moderate adverse impacts on soils and geology would result from Alternative 3 due to soil and bedrock excavation and displacement. Construction of the permanent underground main irrigation trunk line would result in short-term, localized, minor adverse impacts on soils, as discussed in Section 3.2.2.2 above.

The primary difference between Alternatives 2 and 3 would be the additional surface area and depth of excavation needed to store the proposed volume of effluent. Additional geotechnical investigations would be conducted prior to construction of the surface reservoir under Alternative 3 to determine the extent of excavation required. Soils would be excavated using conventional equipment; however; larger excavation equipment would likely be required for excavations into the upper two to six feet of schist bedrock. Soils excavated during construction would be temporarily stockpiled and used for reservoir embankment/berm construction. Rock less than 12 inches in size, broken down from excavated bedrock, would most likely be used for embankment backfill as well (AET, 2003).

Blasting and/or larger rippers could be used in the event that deeper excavation into the schist bedrock is required. The utilization of explosives for rock blasting is a traditional process of excavation that is primarily used for hard rocks, such as granite. It is likely that blasting would not be required at the proposed site due to the type of bedrock, which mostly consists of schist

and sandy material. If excavation is performed by blasting, damage to the remaining rock mass, generation of vibration, noise, fly-rocks, and dust could occur. Generation of elastic waves or vibrations that are transmitted to the surrounding ground may induce damage to the nearby structures in and outside the Park border. Creation of shock waves, commonly known as noise, could cause breakage of windows and other brittle structural components. Damage to the remaining rock could result in rock quality degradation. However, due to the project size, no major adverse impacts from blasting are expected to occur. Implementation of proper practices could eliminate any possible adverse impacts from blasting. Depending on the intensity of the explosion, localized, short- to long-term, minor to moderate, adverse impacts on geology from blasting activities are likely to occur.

3.2.3 Cumulative Impacts

Since no impacts on soils and geology would occur under Alternative 1, this alternative would not contribute to cumulative impacts on these resources.

Implementation of Alternatives 2 and 3 would increase the amount of land disturbance and disturbance of native vegetative cover, which could result in increased soil erosion at the Memorial. As a result of previous development activities, including construction of visitor and administrative facilities, soil erosion is currently a problem at the Memorial. However, the NPS has implemented a program to promote erosion control, which includes inventorying and mapping disturbed sites, replacing lost topsoil in areas worn to bedrock, and revegetation with native plants (NPS, 2000a). Therefore, implementation of Alternative 2 or 3 would not contribute to a significant cumulative increase in soil erosion at the Memorial.

Past, present, and future development projects at the Memorial, combined with the implementation of Alternative 3 could result in cumulative impacts on the geology. However, the localized nature of the project and implementation of proper practices would eliminate any significant cumulative impacts on this resource area.

3.3 WATER RESOURCES

3.3.1 Affected Environment

The Memorial is located within the Black Hills region of the Cheyenne River Basin, which drains into the Missouri River. The Black Hills region generally has the best surface water quality in the state due in large part to a cooler climate during the growing season, higher rainfall than the surrounding plains, and low erodibility of local bedrock formations. Several intermittent streams are located on the Memorial, including two unnamed tributaries to Grizzly Bear Creek and Lafferty Gulch, a tributary to Battle Creek. Grizzly Bear Creek borders the Memorial to the south and east and drains into Battle Creek just west of Keystone. Battle Creek is located north of the Memorial and flows east through Keystone.

The South Dakota DENR monitors the surface water in the state to determine whether or not a body of water is meeting its assigned water quality beneficial uses. South Dakota's water quality

standards consist of beneficial use classifications and water quality criteria necessary to protect these uses. The intermittent streams on the Memorial are classified as fish and wildlife propagation, recreation, and stock watering, and irrigation waters. Upper Battle Creek is classified as coldwater permanent fish life propagation waters; limited contact recreation waters; fish and wildlife propagation, recreation, and stock watering; and irrigation waters. Battle Creek is in full support of all uses except for its coldwater fishery, which is in non-support due to impairment by high thermal modifications and pH. These impairments may be attributed to natural conditions, such as low stream flow (DENR, 2002).

3.3.2 Environmental Consequences

3.3.2.1 Alternative 1: No Action

Under Alternative 1, the wastewater effluent would not be recycled and would continue to be discharged into Lafferty Gulch, having long-term, moderate, localized impacts on freshwater resources and water quality.

The Memorial would continue to use the Park's freshwater supply for grounds irrigation, vehicle and pavement cleaning. Waste of freshwater would likely continue from irrigation system leaks. These current uses and waste of freshwater supplied by the Park's only well could impact the Park's freshwater supply and cause a shortage during periods of drought. Additional uses identified by the Park, expanded irrigation, and fire suppression and mitigation would increase the demand for freshwater and cause an increased risk of potential shortages in the future.

Large volumes of wastewater effluent would continue to be discharged into Lafferty Gulch, which drains to Battle Creek. Effluent constituents, such as fecal coliform bacteria, can adversely impact the water quality of Battle Creek. Although the effluent is sampled twice-weekly to comply with South Dakota DENR standards for discharging into an active trout stream, there is the potential for contamination the other 5 days of the week (Foss, 2003b). However, the potential for contamination is negligible based on the fully modernized operations and management of the treatment plant.

3.3.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Short-term, negligible to minor, localized, adverse impacts on water resources would occur during construction activities under Alternative 2. Construction of the aboveground storage tank and underground main irrigation trunk line would involve ground-disturbing activities, such as vegetation clearing and excavation. Construction would be planned to minimize ground disturbance and vegetation removal. Disturbed or exposed soils are vulnerable to erosion and can contribute to sedimentation of nearby streams. Construction of the aboveground storage tank and main irrigation trunk line could temporarily degrade the water quality of downstream waters if erosion and sediment is not controlled. The aboveground storage tank would be constructed at the wastewater treatment facility site within Lafferty Gulch, while the underground main irrigation trunk line would be constructed under the Presidential Trail, which drains to an unnamed intermittent tributary to Grizzly Bear Creek located southwest of State Route 87.

Water quality impacts during construction would be minimized by implementing erosion and sediment controls. Storm water runoff would be diverted from flowing on disturbed areas at the aboveground storage tank construction site, minimizing sediment transport. Other structural controls, such as silt fencing, would be used to intercept sediment in runoff before it drains to surface waters. The contractor would need to obtain a general storm water permit from the DENR for any construction activity that disturbs one or more acres. Prior to the start of construction, a Pollution Prevention Plan must be developed as part of the storm water permit. The plan must give a description of how runoff will be controlled and pollution will be reduced both during and after construction.

As with almost any construction project involving the use of heavy equipment, there is some risk of an accidental fuel product or chemical spill, which could adversely affect water quality if the spilled chemical were to enter surface waters. All employees that would be exposed to hazardous materials at the construction site would be trained and instructed in approved methods for handling and storage of such materials (NPS, 2000c). Therefore, the probability of an accidental spill would be very low. The NPS would also require mitigation specifications to control fuel and equipment storage and handling for the project. All fuel and hazardous material storage would be restricted to areas away from any surface water resource. In addition, all fuel or chemical spills would be required to be cleaned up in accordance with U.S. Environmental Protection Agency (USEPA) and Occupational Safety and Health Administration (OSHA) regulations. With implementation of these measures, the potential for an accidental chemical or fuel spill to occur and result in adverse impacts on water resources would be negligible.

Long-term, moderate, localized impacts on water resources would occur from operation of the effluent recycling system under Alternative 2. Upon completion of construction, the tank would be filled with treated wastewater, temporarily eliminating discharge into Lafferty Gulch. Discharge would resume once the tank was filled to capacity; however, discharge levels would be decreased since some of the wastewater would be rerouted for reuse on the Memorial. This reduction in discharge volume would alter the hydrology of Lafferty Gulch. However, it should be noted that current flow levels do not represent the baseline hydrologic condition of the stream since the wastewater discharge is not a naturally occurring drainage.

Concerns have been expressed over the potential for runoff of effluent from irrigated areas on the Memorial and that the effluent may not be of suitable quality to reuse on the Memorial. The Memorial's Surface Water Discharge permit would need to be modified to incorporate the new outfall and recycling/irrigation process as a permanent part of its permitted wastewater treatment system. In accordance with the conditions of the modified permit, the effluent irrigation application rate would be controlled to prevent any surface runoff of the effluent. In no case would the application rate exceed ¼ inch per hour or 2 inches per acre per week. To prevent ground saturation and runoff, no application would be permitted during periods of heavy or prolonged rainfall, snow cover, or when the ground is frozen (Thunstrom, 2003a). In addition, the South Dakota DENR would require sampling of the storage tank contents prior to reuse. The NPS would regularly monitor the quality of wastewater stored in the tank for compliance with State standards, and would report monitoring results to the DENR. The permit modification would require more restrictive limits for parameters such as fecal coliform (10/100mL), and any other limitations that

would be protective of human health and the environment (Thunstrom, 2003a). Additional UV treatment of the stored effluent would be required to meet these more restrictive parameter limits.

Long-term, negligible to moderate, localized benefits to water resources would occur from operation of the effluent recycling system under Alternative 2. The Memorial would reuse the stored wastewater effluent for grounds irrigation and vehicle and pavement cleaning, which would reduce the impact on the Park's freshwater supply. Irrigation system leaks would no longer result in a loss of freshwater. This decrease in freshwater use and waste would reduce the risk of water shortages during periods of drought. Additional uses identified by the Park, expanded irrigation, and fire suppression and mitigation could be met by effluent reuse, further conserving freshwater supplies.

Potential water quality improvements may result from the reduction of effluent discharge into Lafferty Gulch. Reductions in effluent discharge volumes would reduce the risk of potential contamination of Lafferty Gulch and Battle Creek from effluent constituents, such as fecal coliform bacteria. Although the effluent is sampled twice weekly to comply with DENR standards for discharging into an active trout stream, there is the potential for contamination the other 5 days of the week (Foss, 2003b).

3.3.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Short-term, negligible to minor, localized, adverse impacts on water resources would occur during construction activities under Alternative 3. Construction of the surface reservoir and underground main irrigation trunk line would involve ground-disturbing activities, such as vegetation clearing and excavation. The surface reservoir would require a greater area of disturbance than that for the aboveground storage tank under Alternative 2; however, water quality impacts and mitigation measures would be similar to those described in Section 3.3.2.2.

Long-term, moderate, localized impacts on water resources would occur from operation of the effluent recycling system under Alternative 3. During the impoundment of the reservoir, downstream flows to Lafferty Gulch would be curtailed temporarily. Discharge would resume once the reservoir was filled to capacity; however, discharge levels would be decreased since some of the wastewater would be rerouted for reuse on the Memorial. Storm water runoff would be diverted around the reservoir to prevent sedimentation and other potential pollution of the reservoir. The storm water would be routed to drain to Lafferty Gulch further downstream. The impoundment of water and reduction of effluent discharge volume would restrict and reduce flow to Lafferty Gulch, altering the stream's hydrology over the long-term. A permit would be required from the U.S. Army Corps of Engineers (USACE) to authorize the construction of a dam in a navigable water of the United States pursuant to Section 9 of the Rivers and Harbors Act of 1899 and Section 404 of the CWA, as amended (33 CFR 321). The USACE's South Dakota regulatory office, Omaha District, would be contacted prior to construction for permitting consultation. Conditions of the permit would likely include minimizing flow restrictions to the maximum extent possible.

Concerns have been expressed over the potential for runoff of effluent from irrigated areas on the Memorial and that the effluent may not be of suitable quality to reuse on the Memorial. The

Memorial's Surface Water Discharge permit would need to be modified to incorporate the new outfall and recycling/irrigation process as a permanent part of its permitted wastewater treatment system. In accordance with the conditions of the modified permit, the effluent irrigation application rate would be controlled to prevent any surface runoff of the effluent. In no case would the application rate exceed ¼ inch per hour or 2 inches per acre per week. To prevent ground saturation and runoff, no application would be permitted during periods of heavy or prolonged rainfall, snow cover, or when the ground is frozen (Thunstrom, 2003a). In addition, the South Dakota DENR would require sampling of the reservoir contents prior to reuse. The NPS would regularly monitor the quality of wastewater stored in the reservoir for compliance with State standards, and would report monitoring results to the DENR. The quality of the stored effluent in the surface reservoir may be degraded by wildlife using it as a water source and/or habitat. Wildlife can contribute to fecal coliform bacteria contamination. However, the permit modification would require more restrictive limits for parameters such as fecal coliform (10/100mL), and any other limitations that would be protective of human health and the environment (Thunstrom, 2003a). Additional UV treatment of the stored effluent will be required to treat additional fecal coliform from wildlife and to meet these more restrictive parameter limits.

Long-term, negligible to moderate, localized benefits to water resources would occur from operation of the effluent recycling system under Alternative 3, as described for Alternative 2 in Section 3.3.2.2.

3.3.3 Cumulative Impacts

Under Alternative 1, current uses and waste of the Park's freshwater supply would continue. Additional uses or needs identified in the future would increase the demand for freshwater at the Memorial and potentially cause a shortage during periods of drought. Therefore, there is the potential for long-term, adverse, cumulative impacts on the Park's freshwater resources from Alternative 1.

Implementation of Alternative 2 and 3 would increase the amount of land disturbance at the Memorial, which could adversely impact the water quality of nearby streams over the short-term. Development activities since 1925 have likely contributed to short-term water quality degradation of surface waters at the Memorial, particularly construction of the parking facility, amphitheatre, visitor's center, and concessions complex in 1998. However, implementation of erosion and sediment controls would minimize these impacts. In addition, the NPS has plans to restore eroded areas on the Memorial in the future, with restoration occurring on a target acreage annually (NPS, 2000a). Therefore, implementation of Alternative 2 or 3 would not contribute to significant cumulative impacts on surface water quality.

3.4 VEGETATION AND WILDLIFE

3.4.1 Affected Environment

Vegetation

Ponderosa pine (*Pinus ponderosa*) of varying age is the dominant vegetation type in the Mount Rushmore National Memorial (USGS, 2003; APN, 2001). **Table 3-1** presents the primary vegetation classifications within the immediate project area.

Table 3-1. Primary Vegetation Classifications Within the Project Area

Name	Canopy	Subcanopy	Short Shrub Layer	Herbaceous Layer	Location
Pinus ponderosa/ Arctostaphylos uva-ursi Woodland (Ponderosa Pine/ Bearberry (or Kinikinnick)	*P. ponderosa*; usually <25% coverage	*P. ponderosa* & *Populous tremuloids*; usually sparse or absent, but can have up to 60% coverage	*A. uva-ursi*; usually >10% coverage, often 25-60%	None	Uplands on gentle to moderate slopes underlain by granite; rock outcrops are common
P. ponderosa/ Oryzopsis asperifolia Woodland (Ponderosa Pine/ Rough-Leaved Ricegrass)	*P. ponderosa*; usually 10-60% coverage	*P. ponderosa*; usually 10-60% coverage	Variable; *Juniperus communis* & *Symphoricarpos albus* most consistent	*O. asperifolia* most consistent; 10-25% cover	Uplands on gentle to moderate slopes (<20 degrees) underlain by granite & schist
P. ponderosa/ Schizachyrium scoparium (Ponderosa Pine/ Little Bluestem) Wooded Herbaceous Vegetation	*P. ponderosa*; moderate to high coverage (50-100%)	*P. ponderosa*; moderate to high coverage (50-100%)	*J. communis* most consistent but rarely abundant	*S. scoparium*; >50% coverage	Uplands on 13 to 24-degree slopes underlain by schist
P. ponderosa/J. communis Woodland (Ponderosa Pine/ Common Juniper)	*P. ponderosa*; usually 10-25% coverage	*P. ponderosa*; usually 25-60% coverage	*J. communis* most consistent but rarely abundant	*Carex rossii* & *Danthoia spicata* common; <25% coverage	Upland on moderate to steep slopes (15 to 30 degrees) underlain with granite and/or schist; rock outcrops common

Source: USGS-NPS, 2003

Many of the ponderosa pine stands in the Memorial and surrounding areas contain high densities of trees. While these stands are currently a fire hazard for the Park, a fire management program, including activities such as thinning and prescribed burning, is being implemented (NPS, 2002a).

Noxious weeds in the Memorial are found in several areas, especially former construction zones, and the Memorial has a program in place to control their spread. Some of the more prevalent invasive/exotic plant species include Canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*), musk thistle (*Carduus nutans*), sweet clover (*Melilotus officinalis*), common mullein (*Verbascum thapsus*), and hound's tongue (*Cynoglossum officinale*). The majority, if not all, of the riparian vegetation along Lafferty Gulch consists of invasive species.

Wildlife

A variety of wildlife resources inhabit the forests and grasslands of Mount Rushmore National Memorial including ungulates, small mammals, birds, reptiles, amphibians, and invertebrates. Large mammals often found in the area include white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*), mountain goat (*Oreamnos americanus*), and coyotes. Smaller mammals include least chipmunks (*Eutamius minimus*), porcupines (*Erethizon dorsatum*), red squirrels (*Tamiassciurus hudsonicus*), wood rats, raccoons, beavers, badgers, and skunks. Common bird species include turkey vultures (*Cathartes aura*), pygmy nuthatches (*Sitta pygmaea*), brown creepers (*Certhia americana*), northern flickers (*Colaptes auratus*), hairy woodpeckers (*Picoides villosus*), hawks, and meadowlarks. Occasionally, mountain lions (*Felis concolor*) and elk (*Cervus elaphus*) are found in the area (NPS, No date; APN, 2001). The Memorial is currently conducting an inventory of all wildlife species on the Memorial.

NPS Management Policies (2001) state "*the National Park Service will inventory, monitor, and manage state and locally listed species in a manner similar to its treatment of federally listed species, to the greatest extent possible*." There are 13 species of animals that are currently listed by the State of South Dakota, Department of Game, Fish and Parks (SDGFP) as endangered. They are peregrine falcon (*Falco peregrinus*), whooping crane, eskimo curlew (*Numenius borealis*), bald eagle (*Haliaeetus leucocephalus*), interior least tern (*Sterna antillarum*), black-footed ferret (*Mustela nigripes*), lined snake (*Tropidoclonion lineatum*), Blanding's turtle (*Emydoidea blandingii*), pallid sturgeon (*Scaphirhynchus albus*), finescale dace (*Phoxinus eos*), central mudminnow (*Umbra limi*), blacknose shiner (*Notropis heterolepis*), and banded killifish (*Fundulus diaphanus*) (SDGFP, 2000). Of these species, the peregrine falcon is the most likely to be sighted within the Memorial during migration (Ode, 2002).

At the present time, there are 15 species of animals that are listed by the SDGFP as threatened. They are: American dipper (*Cinclus mexicanus*), osprey (*Pandion haliaetus*), piping plover (*Charadrius melodus*), black bear (*Ursus americanus*), mountain lion (*Felis concolor*), swift fox (*Vulpes velox*), river otter (*Lutra canadensis*), false map turtle (*Graptemys pseeudogeographica*), Eastern hognose snake (*Heterodon platirhinos*), trout-perch (*Percopsis omiscomaycus*), sturgeon chub (*Machrhybopsis gelida*), sicklefin chub (*Machrhybopsis meeki*), northern redbelly dace (*Phoxinus eos*), pearl dace (*Semotilus margarita*), and longnose sucker (*Catostomus catostomus*) (SDGFP, 2000). Of these species, only the mountain lion is known to frequent the Memorial (Ode, 2002).

3.4.2 Environmental Consequences

3.4.2.1 Alternative 1: No Action

Under Alternative 1, the wastewater effluent would not be recycled, and would continue to be discharged into Lafferty Gulch. The existing grounds irrigation system would continue to use the Memorial's freshwater supply to irrigate landscaped areas. No impacts on vegetation or wildlife would occur as a result of this alternative.

3.4.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Short-term, negligible to minor, localized, adverse impacts on vegetation and wildlife would occur during construction activities under Alternative 2. Implementation of Alternative 2 would primarily require the removal of vegetation from the proposed site of the aboveground tank, including grass, shrubs, and a few trees. Vegetation removal during construction would result in the permanent loss of a negligible to minor amount of marginal wildlife habitat on the project site. However, there are many acres of better quality wildlife habitat surrounding the project site, including on adjacent Forest Service lands, that would remain unaffected by Alternative 2. In addition, all disturbed areas not needed to remain cleared for maintenance purposes would be seeded with a native species mix and allowed to revegetate upon completion of construction.

No new vegetative disturbance is proposed for the installation of the permanent grounds irrigation trunk line. All disturbances would occur in the existing utility corridors and under Presidential Trail. The affected utility corridors may currently serve as marginal edge habitat for some wildlife species, and some species may currently forage in these areas. While this habitat would be temporarily disturbed during construction activities, it would remain available for wildlife use post-construction.

Terrestrial wildlife within and adjacent to the project area would be affected temporarily during the six- to seven-month construction period. The presence of workers and equipment at the project site and noise associated with equipment use would disturb surrounding wildlife, resulting in temporary displacement of some wildlife from the area. However, no permanent displacement of wildlife would occur.

As with almost any construction project involving the use of heavy equipment, there is some risk of an accidental fuel product or chemical spill, which could adversely affect vegetation and wildlife, as well as aquatic species and habitat if the spilled chemical were to enter surface waters. All employees that would be exposed to hazardous materials at the construction site would be trained and instructed in approved methods for handling and storage of such materials (NPS, 2000c). Therefore, the probability of an accidental spill would be very low. The NPS would also require mitigation specifications to control fuel and equipment storage and handling for the project. All fuel and hazardous material storage would be restricted to areas away from any surface water resource. In addition, all fuel or chemical spills would be required to be cleaned up in accordance with USEPA and OSHA regulations. With implementation of these measures, the potential for an accidental chemical or fuel spill to occur and result in adverse impacts on vegetation, wildlife, or aquatic species or habitats would be negligible.

Upon completion of construction, the tank would be filled with treated wastewater directly from the facility, temporarily reducing and/or eliminating the amount of water flowing in Lafferty Gulch. Although this water reduction could adversely affect riparian vegetation along the Gulch, this vegetation consists primarily of invasive species and is not naturally occurring. Therefore, this temporary adverse impact on riparian vegetation along Lafferty Gulch would be negligible to minor in intensity. Since no aquatic species, except for occasional crayfish, use or depend on the Gulch, a reduction in flow within the stream would only have minor, at most, impacts on aquatic species during filling of the tank. Once the tank is full, overflow would continue to be discharged into Lafferty Gulch.

Concerns have been expressed over the potential for irrigative use of the proposed effluent recycling system to cause unwanted vegetation growth around the Memorial over the long-term. Implementation of the new recycling system would not change the extent of the existing irrigation system on the Memorial. The new system would connect to the existing irrigation system, and would be used only to irrigate landscaped/developed areas at the Memorial. These areas currently undergo irrigation during summer months, and are not anticipated to be additionally impacted by changing the irrigation water source.

However, the proposed effluent recycling system would also be used for fire suppression activities around other portions of the Memorial, which would add a source of water in these areas, and could somewhat increase vegetative growth. Since fire suppression activities would only occur on an as needed basis, not regularly, use of effluent in these areas would only result in minor impacts on vegetation growth.

Over the long-term, indirect beneficial impacts on vegetation and wildlife would be anticipated from Alternative 2 through a reduction in the potential for a catastrophic wildfire to occur and destroy area vegetation and wildlife habitats. This would also indirectly benefit area wildlife over the long-term through preservation of existing habitat at the Memorial.

3.4.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Short- and long-term impacts on vegetation and wildlife resulting from Alternative 3 would be similar to those resulting from Alternative 2. Refer to Section 3.4.2.2 for a discussion of these impacts. However, under Alternative 3, a slightly larger area of disturbance may be necessary for construction of a surface reservoir on the project site, which could eliminate a somewhat larger amount of marginal wildlife habitat from the area, as well as increase the potential for sedimentation to Lafferty Gulch during construction, affecting aquatic species downstream. However, neither of these impacts would be increased to a significant level.

The presence of an open surface water reservoir could pose additional long-term impacts on area wildlife. Certain wildlife, including birds, would likely be attracted to the reservoir, which would provide new, artificial habitat for some species, increasing localized populations. While to many observers this may be viewed as a beneficial impact, the NPS would view this as an adverse impact on wildlife, since the NPS aims to preserve natural conditions and processes on

their lands. However, this would not be considered a major impact on individual species, populations, or the ecosystem as a whole.

While the effluent discharged into the reservoir would be of good enough quality not to adversely affect wildlife drinking from the reservoir, the presence of wildlife around the reservoir may lead to concerns about increasing fecal coliform levels in the reservoir. However, no adverse impacts on wildlife are anticipated to result (Licht, 2003). In addition, the permit modification required from the DENR would require much more restrictive fecal coliform levels to be maintained within the reservoir (Thunstrom, 2003a).

3.4.3 Cumulative Impacts

Since Alternative 1 would not result in any impacts on vegetation or wildlife, implementation of this alternative would not contribute to cumulative impacts on vegetation or wildlife.

Implementation of Alternative 2 or 3 would increase the amount of land disturbance at the Memorial, which could present new areas for easy establishment of non-native or exotic species. As discussed previously, non-native species are currently a problem at the Memorial. However, the NPS has implemented a program to eliminate exotic species wherever feasible and possible, and conditions are improving as a result of this program. Therefore, implementation of Alternative 2 or 3 would not contribute to significant increases in invasive species at the Memorial.

Long-term, beneficial, cumulative impacts on vegetation and wildlife would be expected to result from Alternatives 2 and 3. These alternatives, combined with implementation of the Memorial's revised fire management plan, would further reduce the potential for a catastrophic wildfire to occur on the Park and destroy habitats and wildlife species.

3.5 AIR QUALITY

3.5.1 Affected Environment

Under the Federal Clean Air Act (CAA), as amended in 1977 and 1990 (40 CFR 50), the U.S. Environmental Protection Agency (USEPA) has established air quality standards in regard to the types of air pollutants emitted by internal combustion engines, such as those in aircraft, vehicles, and other sources. These National Ambient Air Quality Standards (NAAQS) include primary and secondary standards and apply to the ambient air (the air that the general public is exposed to every day). The NAAQS are established for six contaminants, referred to as criteria pollutants, including carbon monoxide (CO), ozone (O_3), particulate matter (PM_{10}), nitrogen oxides (No_x), sulfur dioxide (SO_2),and lead (Pb). In addition to these six criteria pollutants, Volatile Organic Compounds (VOCs) are a source of concern and are regulated as a precursor to ozone. VOCs are created when fuels or organic waste materials are burned. Most hydrocarbons are presumed to be VOCs in the regulatory context, unless otherwise specified by the USEPA (USEPA, 2003).

Areas where the ambient air quality does not meet the NAAQS are said to be non-attainment areas. Areas where the ambient air currently meets the national standards are said to be in attainment. Currently, the USEPA classifies Pennington County, South Dakota, as well as its surrounding counties, as being in attainment for all six criteria pollutants (USEPA, 2003). However, several major sources of air pollution (sources that emit more than 100 tons/year of one or more regulated pollutants) are nearby the Memorial. These include coal-fired power plants in Rapid City and Lead, South Dakota, and Osage, Wyoming; three cement plants in Rapid City; and a refinery and a natural gas pipeline compressor station in Newcastle, Wyoming. A number of minor sources are also located in the vicinity of the Memorial, including sawmills in the areas of Pringle and Custer, South Dakota, and Newcastle, Wyoming and a feldspar mill in Custer. Regardless, the Memorial has historically experienced excellent air quality.

Air quality and visibility monitoring have been conducted in the Black Hills for many years. There are several monitors in Rapid City, approximately 40 air miles northeast of the Memorial, which measure total suspended particulates, fine particles, sulfur dioxide, and nitrogen dioxide. Air quality monitoring stations for particulate matter 2.5 and 10 microns ($PM_{2.5}$ and PM_{10}) are located at Badlands National Park and Wind Cave National Park. Monitoring of particulate matter at Wind Cave National Park reveals that air quality is excellent, with $PM_{2.5}$ and PM_{10} registering at background levels (Schultz, 2002).

3.5.2 Environmental Consequences

Existing information on air quality was reviewed to identify air quality issues, with particular attention paid to background ambient air quality compared to the primary NAAQS. Relevant regulatory requirements under the conformity provision of Section 176(c) of the CAA, as amended in 1990, provide that Federal agencies are prohibited from engaging in, supporting in any way, providing financial assistance for, licensing, permitting, or approving, any activity which does not conform to an applicable state implementation plan under the CAA. Federal actions must be "in conformity" with whatever restrictions or limitations the State has established for air emissions necessary to attain compliance with NAAQS.

The activities under the proposed action do not require adherence to the Federal Transportation or General Conformity regulations (40 CFR Part 51, Subparts W and T) because the project site is located in an area currently classified as "in attainment" for all criteria pollutants. However, for the purposes of this analysis and to establish criteria for air quality effects, the air quality criteria under the conformity regulations will be used to assess potential air quality impacts. Under the General Conformity Rule, conformity determinations are made for each pollutant where the total of direct and indirect emissions caused by a Federal action would equal or exceed the thresholds established under the rule. These thresholds are referred to as *de minimis* criteria. The term *de minimis* refers to, among other things, emissions that are "so small as to be negligible or insignificant." In order to qualify as *de minimis,* the thresholds established under the General Conformity Rule are 100 tons per year or less for each pollutant. If the total emissions resulting from an action are below the *de minimis* emission thresholds, or if the action is listed as exempt under the Rule due to no emissions or clearly *de minimis* emissions levels, then a conformity determination is not required.

3.5.2.1 Alternative 1: No Action

Under Alternative 1, the proposed construction of an effluent recycling system would not occur. No additional emissions or fugitive dust would be generated under this alternative. Existing air quality conditions and patterns in the area would continue.

3.5.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Construction air emissions estimates were made by first making assumptions as to which equipment would be used during construction and for how long. Once these assumptions were made, the following models and emission factors developed by the USEPA were used to estimate the amount of emissions anticipated to be generated:

- NONROAD Emissions Model (USEPA, 1999);
- Mobile Source Observation Database (USEPA, 2000a); and
- AP-42, Compilation of Air Pollutant Emission Factors, Volume II Mobile Sources (USEPA, 2000b).

Table 3-2 lists the equipment expected to be used during construction under Alternative 2, and assumptions as to the total number of hours of use. For the purposes of the air quality analysis, it was assumed that construction would occur approximately 8 hours per day (during daylight hours only), 5 days a week, for approximately 6 to 7 months in total. Assuming that 20 workdays occur in a given month, the total number of work hours for the project would be approximated 1,120 hours (20 days x 8 hours per day x 7 months). Not all equipment would be used for the entire duration of construction, and not all equipment would be used at the same time.

Some types of heavy equipment have emissions and characteristics similar to other types of equipment; for these equipment types, a general USEPA equipment category was used. In addition, since it is not possible to determine at this time the exact rating (power) for each equipment type proposed for use, a worst-case emissions measurement was used for each type of equipment listed in **Table 3-2**. Actual emissions generated would very likely be less than estimates presented here (and in some cases, much less). In addition, small tools and pumps are assumed to run constantly to ensure a worst-case scenario emissions estimate for these equipment types. Assumptions regarding hours of use are designed to be very conservative; in other words, each piece of equipment would likely be used for less time than indicated in **Table 3-2**.

Table 3-2. Equipment Assumptions For Alternative 2 Construction Air Emissions Analysis

Equipment Type/Use*	Total Hours*	Total 8-Hour Days
2 Trucks-Off Highway	1,120	140
2 Tractor/Loader/Dozers	1,680	210
Grader	160	20
Bore/Drill Rig	320	40
Cement/Mortar Mixer	240	30
Rubber Tire Tractor/Dozer	320	40

2 Trucks – Highway	640	80
Trencher	160	20
Crane	80	10
3 Service Trucks	1,680	210
Compactor	320	40
Welder	160	20
2 Generators	2,240	280
2 Air Compressors	736	92
Miscellaneous Small Tools	1,120	140
*Where more than one piece of the same equipment type is anticipated to be used, the hours presented represent the total hours of all pieces of the same equipment.		

Using this equipment, along with the projected hours of use, air emissions levels were determined. The results are shown in **Table 3-3**.

Table 3-3. Equipment Emissions (in tons) During Construction Activities Under Alternative 2

Carbon Monoxide (CO)	Nitrogen Oxides (NO_x)	Sulfur Dioxide (SO_2)	Particulate Matter (PM_{10})	Volatile Organic Compounds (VOCs)
36.51	9.01	2.59	2.05	2.53

As shown in **Table 3-3**, none of the criteria pollutants even remotely approach the *de minimis* threshold levels of 100 tons. As stated previously, NO_x and VOCs are ozone precursors, and the combination of these two pollutants should be below the *de minimis* threshold levels of 100 tons in order not to create excessive levels of ozone. Using the above stated scenario, the total emissions from this equipment set would be 9.01 tons of NO_x and 2.53 tons of VOCs. Their sum is well below the 100-ton standard. Additionally, with the virtual elimination of leaded fuels in this country, it would be improbable that there would be any measurable level of lead produced by this action. In sum, the daily and total emissions from equipment used during construction would not be high enough to significantly deteriorate the air quality of the region. Only short-term, negligible, adverse impacts on air quality would occur from equipment emissions during construction under Alternative 2.

Fugitive Dust Emissions: particulate matter of soil or other materials, which are temporarily suspended in air.

In addition to tailpipe emissions from heavy equipment, the short-term disturbance of ground surface during excavation and grading activities may lead to fugitive dust emissions. Under South Dakota DENR Ordinance #12, *Fugitive Dust Regulation-Control of Fugitive Dust*, Rule #1.5, prior to all construction activities involving clearing and earthmoving on more than one cumulative acre of land in Pennington County, South Dakota, the construction contractor must obtain a construction permit from the Air Quality Division. This construction permit would provide for and require reasonably available control technology to prevent fugitive emissions from becoming airborne. Such control measures may include: sprinkling to keep the disturbed area damp, use of chemical stabilization, quick site reclamation, routine cleaning of paved areas, and erosion and sediment controls. In addition, this Ordinance requires that all disturbed sites be stabilized or reclaimed by revegetation and/or landscaping measures as soon as grading or construction is completed to minimize wind and/or water erosion and fugitive dust emissions over the long-term (PCBC, 2002).

No significant, long-term, adverse impacts on air quality are anticipated as a result of Alternative 2. Current levels and trends in vehicle emissions and fugitive dust at the Memorial would not change as a result of this alternative. However, the new effluent irrigation system would involve the operation of a central pumping station and inline booster pumps. Assuming two pumps and two generators are used to operate this system, and assuming a worst-case operating period of 12-hours a day for 183 days (April 1 to September 30), anticipated annual long-term air emissions levels are shown in **Table 3-4**.

Table 3-4. Annual Emissions (in tons) From Operations Under Alternative 2

Carbon Monoxide (CO)	Nitrogen Oxides (NO_x)	Sulfur Dioxide (SO_2)	Particulate Matter (PM_{10})	Volatile Organic Compounds (VOCs)
64.48	0.33	0.04	0.01	1.75

As shown in **Table 3-4**, none of the criteria pollutants even remotely approach the *de minimis* threshold levels of 100 tons. Therefore, the annual emissions from operations under Alternative 2 would not be high enough to significantly deteriorate the air quality of the region. Only minor, long-term impacts would occur. Alternative 2 would not result in an impairment of the Park's air resources.

On the contrary, this alternative could contribute to beneficial impacts on air quality over the long-term by reducing the potential for a catastrophic fire to occur, or improving the fire suppression capabilities in the event of a fire. Reducing the potential for and/or severity of a fire in the region would reduce the amount of smoke generated, thereby reducing the adverse air quality impacts that result from fires.

3.5.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

As with Alternative 2, construction air emissions estimates under Alternative 3 were made by first making assumptions as to which equipment would be used during construction and for how long. **Table 3-5** lists the equipment expected to be used during construction under Alternative 3, and assumptions as to the total number of hours of use. The same general assumptions regarding construction times and equipment use described for Alternative 2 also apply to Alternative 3. Assumptions regarding hours of use are designed to be very conservative; in other words, each piece of equipment would likely be used for less time than indicated in **Table 3-5**.

Table 3-5. Equipment Assumptions For Alternative 3 Construction Air Emissions Analysis

Equipment Type/Use*	Total Hours*	Total 8-Hour Days
2 Trucks-Off Highway	1120	140
3 Tractor/Loader/Dozers	2800	350
Grader	160	20
2 Bore/Drill Rigs	640	80
Rubber Tire Tractor/Dozer	320	40
2 Trucks – Highway	640	80
Trencher	160	20
3 Service Trucks	1680	210
Compactor	320	40

Dewatering Pump	160	20
Welder	160	20
2 Generators	2240	280
2 Air Compressors	736	92
Miscellaneous Small Tools	1,120	140
*Where more than one piece of the same equipment type is anticipated to be used, the hours presented represent the total hours of all pieces of the same equipment.		

Using this equipment, along with the projected hours of use, air emissions levels were determined. The results are shown in **Table 3-6**.

Table 3-6. Equipment Emissions (in tons) During Construction Activities Under Alternative 3

Carbon Monoxide (CO)	Nitrogen Oxides (NO_x)	Sulfur Dioxide (SO_2)	Particulate Matter (PM_{10})	Volatile Organic Compounds (VOCs)
39.78	12.59	3.69	3.14	3.43

As shown in **Table 3-6**, none of the criteria pollutants even remotely approach the *de minimis* threshold levels of 100 tons. In addition, the sum of total emissions of NO_x and VOCs (ozone precursors) would be well below the *de minimis* threshold levels of 100 tons. In sum, the daily and total emissions from equipment used during construction would not be high enough to significantly deteriorate the air quality of the region. Only short-term, negligible, adverse impacts on air quality would occur from equipment emissions during construction under Alternative 3.

A larger amount of fugitive dust emissions would be expected during construction under Alternative 3 than under Alternative 2, due to the larger area for excavation (both for the reservoir and for the main trunk line). However, this larger amount of dust is not anticipated to have major adverse impacts on air quality. In addition, the construction contractor would still need to obtain a construction permit from the South Dakota DENR under this alternative, which would require the contractor to undertake measures to minimize fugitive dust emissions.

Long-term impacts on air quality resulting from Alternative 3 would be the same as those resulting from Alternative 2, discussed in Section 3.5.2.2 above. Refer to that discussion for these impacts.

3.5.3 Cumulative Impacts

Since Alternative 1 would have no effect on air quality, this alternative would not contribute to cumulative impacts on air quality in the region.

The region in which the proposed project is located is in attainment for all criteria pollutants. While other past construction projects, such as visitor use developments, likely had short-term adverse air quality impacts from the generation of equipment emissions and fugitive dust, these impacts were likely nominal, and did not result in a change in the attainment status of the area. Since these activities occurred in the past and had only short-term air quality impacts, there is no

potential for impacts from any of the proposed action alternatives to interact with these past impacts and result in major, adverse cumulative air quality impacts.

Overall, the Alternatives 2 and 3 should have beneficial cumulative impacts on air quality. Other activities occurring and/or projected to occur at the Memorial are aimed at improving natural resource conditions, including air quality. Restoring eroded areas would reduce particulate emissions through wind erosion. In addition, at the expense of minor, short-term adverse air quality impacts, thinning and prescribed fire would minimize the potential for a catastrophic wildfire to occur, which could have a much more substantial effect on air quality. As stated above, Alternatives 2 and 3 could contribute to beneficial air quality impacts by reducing the potential for a catastrophic fire to occur (through irrigation), or improving the fire suppression capabilities in the event of a fire. Therefore, beneficial cumulative impacts on local air quality would be anticipated as a result these alternatives.

3.6 NOISE

The loudest sounds that can be detected comfortably by the human ear have intensities that are 1 trillion (1,000,000,000,000) times larger than those of sounds that can just be detected. Because of this vast range, any attempt to represent the intensity of sound using a linear scale becomes very unwieldy. As a result, a logarithmic unit known as the decibel (dB) is used to represent the intensity of a sound. Such a representation is called a sound level.

Although the dB scale accurately reflects the sound pressure level of a given sound, it does not accurately reflect the sound exposure levels heard by a human observer. The human ear is progressively reduced in sensitivity to sounds in the lower and upper ranges of our audible frequency spectrum. To more accurately assess the loudness of sounds as heard by the human ear, sound levels are measured on the A-weighted decibel (dBA) scale. This sound level scale is progressively reduced in sensitivity to very low and very high-pitched sounds. This method of sound measurement mimics our own sense of hearing, and therefore more accurately assesses the effects of different sound levels on a human observer (DOD, 1978). Sound level examples can be found in **Table 3-7**.

Table 3-7. Common Noise Levels and Their Effects on the Human Ear

Source	Decibel Level (dBA)	Exposure Concern
Soft Whisper	30	Normal safe levels.
Quiet Office	40	
Average Home	50	
Conversational Speech	60	
Busy Traffic	75	May affect hearing in some individuals depending on sensitivity, exposure length, etc.
Noisy Restaurant	80	
Average Factory	80-90	
Pneumatic Drill	100	Continued exposure to noise over 90 dBA may eventually cause hearing impairment
Automobile Horn	120	

Source: DOD, 1978

To accurately assess the impacts of noise exposure on an entire community, dBA sound levels are commonly expressed with a measure that describes the cumulative effects of noise levels over time. The most commonly employed cumulative noise measure for environmental analysis is the Day-Night Sound Level (Ldn). This measure (expressed in dBA) describes the cumulative noise exposure expected from all major noise sources over a 24-hour period. Using the Ldn system, 10 dB is added to the assessment of sound produced by activities occurring between 10 PM and 7 AM. This addition places greater weight on the noise produced by nighttime activities due to the higher sensitivity of communities to noise during these hours.

Certain facilities, communities, and land uses are more sensitive to a given level of noise than others. Such "sensitive receptors" include schools, churches, hospitals, retirement homes, campgrounds, wilderness areas, hiking trails, and species of threatened or endangered wildlife. Impacts from noise production are generally assessed with respect to changes in noise levels experienced at sensitive receptors. Different types of sensitive receptors vary in their acceptance of noise disturbance. As a result, noise impacts for different receptors are often assessed using different noise level standards. Recommended land use and associated noise levels are illustrated in **Table 3-8.**

Table 3-8. Recommended Land Use Noise Levels

Land Use Category	Noise Levels (Ldn)			
	Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential	< 60	60-65	65-75	> 75
Commercial, Retail	< 65	65-75	75-80	> 85
Commercial, Wholesale	< 70	70-80	80-85	> 85
Manufacturing	< 55	55-70	70-80	> 80
Agricultural, Animal Breeding	< 60	60-75	75-80	> 80
Natural Recreation Areas	< 60	60-75	65-75	> 75
Hospitals	< 60	60-65	65-75	> 75
Schools	< 60	60-65	65-75	> 75
Libraries	< 60	60-65	65-75	> 75
Churches	< 60	60-65	65-75	> 75
Nursing Homes	< 60	60-65	65-75	> 75
Playgrounds	< 55	55-65	65-75	> 75

Source: HUD, 1991

3.6.1 Affected Environment

In general, noise levels at the Mount Rushmore National Memorial are typical for a natural recreation area (about 60 dB), with normal noise production occurring as a result of visitor use and vehicle traffic along transecting highways. These noise sources are transient and irregular.

While Mount Rushmore National Memorial does not contain proposed or designated wilderness, it does contain other sensitive receptors. The Presidential Trail, a walking trail and boardwalk providing spectacular close-up views of the mountain sculpture, runs along the south-southeast boundary of the sculpture, curving around to run another 600 feet to the visitor services area.

Although not a true sensitive receptor, the new visitor services center would be sensitive to noise, due to the visitor activities occurring within the building (theatres, museum, etc). In addition, the amphitheatre, which is located behind the Visitor Center, is very sensitive to noise.

3.6.2 Environmental Consequences

3.6.2.1 Alternative 1: No Action

Under Alternative 1, there would be no activities occurring that would increase or decrease noise levels in the area. No noise impacts on sensitive receptors would occur. Noise levels in the area would continue under current patterns.

3.6.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

The equipment likely needed for construction of an aboveground storage tank and main trunk line under Alternative 2, as well as the anticipated hours of usage of each equipment type, is listed in **Table 3-2** in Section 3.5, Air Quality, above. For the purposes of this analysis, it was assumed that construction would occur approximately 8 hours per day (during daylight hours only), 5 days a week, for approximately 6 to 7 months in total.

Under a worst-case scenario, where all of the construction equipment is located very closely together and running/operating at the same time, it is estimated that a noise level of 101.3 dBA could be generated at the aboveground storage tank construction site itself. [Note: This estimate does not include the equipment used solely for construction of the trunk line, since this activity would occur at a different time, and largely at a different location.] This noise level would attenuate (reduce) with increased distance from the site. Assuming that no wind, variations in terrain, foliage, or other factors are taken into consideration, reductions of approximately 3 to 6 dB for each doubling of the distance after 50 feet between the site and receiver would be observed over hard ground (NYDEC, 2001). **Table 3-9** shows the noise levels at various distances from the construction site under this worst-case scenario.

Table 3-9. Equipment Noise Levels at Various Distances From the Construction Site Under Alternative 2

Distance From Site (feet)	Noise Heard by Observer (dBA)
100	95
300	86
500	81
750	78
1,000	75
2,000	69
3,000	66

Source: USEPA, 1971

Table 3-10 shows the approximate distance of each of the primary facilities at Mount Rushmore, including sensitive receptors, from the proposed construction site for the aboveground storage tank.

Table 3-10. Distance of Mount Rushmore Facilities From the Construction Site	
Facility	**Distance From Site (feet)**
Sculptor's Studio	1,200
Visitors Center	2,400
Amphitheatre	2,625
Presidential Trail	2,850

The closest facility to the construction site is the Sculptor's Studio, approximately 1,200 feet away. As shown in **Table 3-9**, at a distance of approximately 1,000 feet from the construction site, the noise level would be 75 dBA. At this distance, noise levels would be just within the "normally acceptable" standards of 60 dBA to 75 dBA for a natural recreation area (see **Table 3-8**, Recommended Land Use Noise Levels, above).

The above calculations assume that the land between the proposed construction site and nearby facilities is hard ground. However, this is not the case. The land between the construction site and nearby facilities is mostly vegetated with forested cover, including grass, shrubs, and trees. Factors such as vegetative cover, terrain, wind, and weather impede the propagation of sound, and thereby provide additional attenuation of noise experienced by an observer. Terrain features (such as grass) may add an additional level of sound attenuation equal to 4.5 dB per doubling of the distance between the source and receiver, and standing vegetation can provide additional reducing effects, depending on its density and height. For example, sound reductions of up to 7 dB can result from dense forest stands 100 feet or greater in depth between the source and receiver (NYDEC, 2001). Topography can also greatly affect sound propagation by reflecting sound away from a nearby receptor (HUD, 1991).

Structural features, such as walls and windows, also affect sound propagation. Sound typically enters a building through its acoustically weakest points, including windows and doors. However, the materials of which these points are composed (glass, wood, etc.) provide additional sound reduction. Depending on the types of materials and their thickness, additional sound reductions of between 2 dBA and 20+ dBA could be expected (HUD, 1991).

Lastly, it is highly improbable that all equipment would be running at the same time and at the same location during construction. Construction would occur in phases, beginning with vegetation clearing and excavation, followed by pouring the foundation (if necessary), tank installation, and grading.

Therefore, construction of the proposed aboveground storage tank is not anticipated to result in major adverse noise impacts at any of the Memorial facilities due to the distance of the construction site from the nearest facility (Sculptor's Studio, 1,200 feet), the forested cover of the land between the site and the nearest facility, and structural features of some of the facilities. While construction noise from the proposed storage tank site would likely be somewhat audible at the Sculptor's Studio, it would not be disruptive enough to affect visitor use, employees, or their work functions. Since all other Memorial facilities are located at a greater distance from the construction site, noise impacts on these facilities would be less than those anticipated at the

Sculptor's Studio, and would be in the "clearly acceptable" or "normally acceptable" noise ranges.

Construction of the main grounds irrigation trunk line, however, would have a much greater effect on visitors to the Memorial, in particular on visitors using the Presidential Trail and the Sculptor's Studio. This main trunk line would be constructed underground within existing utility corridors, around the Sculptor's Studio, and under the Presidential Trail. In two areas, construction would occur within 100 feet of the Sculptor's Studio and the Memorial amphitheatre, and these facilities would be exposed to "clearly unacceptable" noise levels. Likewise, construction under the Presidential Trail would expose nearby users of the Trail to "clearly unacceptable" noise levels. Although these adverse noise effects would be short-term, only affecting a certain stretch of pipeline corridor for a few days, it would be moderate in intensity, and could disrupt visitor use and experience at the Memorial. To reduce these adverse effects, the NPS would require the construction contractor to conduct the majority of main trunk line construction activities (particularly those nearest visitor use facilities) during periods of low visitation at the Memorial (end of September to early April), when few visitors are present on the Presidential Trail, and when the Sculptor's Studio is closed to visitation.

Noise generated from the use of equipment during construction under Alternative 2 would also temporarily disturb wildlife adjacent to the construction sites, and could cause the short-term displacement of some species. However, since noise-generating equipment would be used only for a relatively short duration, any displaced wildlife would be expected to return to the area upon completion of construction. No permanent displacement of wildlife is expected to occur.

The transport of equipment and other materials to and from the construction site would require the use of large trucks, which would generate noise, and would not be restricted to the area adjacent to construction. These noise sources would be transient, and would only affect a given area for a few seconds. Truck traffic would use existing roads to access the project site, which already experience similar vehicular noise impacts.

Over the long-term, the only noise impact from Alternative 2 would be the operation of the inline pumps and pumping station for the irrigation lines. Operation of this equipment would generate minor noise levels over the long-term. To reduce or avoid any long-term impacts to visitors at the Memorial, the NPS would ensure that any noise-generating equipment is located away from visitor use areas and is inaudible at such areas. In addition, in accordance with South Dakota DENR requirements, irrigation activities (and associated use of pumps) would only occur during times when people are not present, such as in the early morning, evening, and nighttime (Thunstrom, 2003a). Therefore, it is unlikely that there would be receptors to this noise source present at the Memorial when this noise source is occurring.

3.6.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Short- and long-term noise impacts resulting from Alternative 3 would be the same as those resulting from Alternative 2, addressed in Section 3.6.2.2 above. Refer to that section for a discussion of these impacts. Although a slightly different equipment set would be used under

Alternative 3, these differences in equipment do not noticeably change the noise calculations from those presented in **Table 3-8**.

3.6.3 Cumulative Impacts

Since Alternative 1 would not result in any noise impacts, implementation of this alternative would not contribute to cumulative impacts on area noise levels.

The majority of noise impacts that would result from the action alternatives would be short-term in duration, occurring only during construction activities. Cumulative noise impacts during this time could only result from other noise-generating activities occurring simultaneously as construction activities, and in close proximity to the noise sources associated with these activities. Although the NPS has undertaken several facility development/construction activities around the Memorial within the past decade, there are currently no construction activities occurring at the Memorial that would interact cumulatively with construction activities under Alternative 2 or 3 to result in significant noise impacts.

Long-term noise impacts from Alternatives 2 and 3 would be associated with operation of the pump station and inline pumps for the irrigation system. As stated above, this noise source would only be operational during times when visitors are not present at the Memorial. In addition, any noise-generating equipment needed for operation of the irrigation system would be located such that it would not affect visitors or Park operations. Therefore, long-term noise impacts from Alternative 2 or 3 would not contribute to significant, cumulative impacts on noise levels at the Memorial.

3.7 VISUAL RESOURCES

3.7.1 Affected Environment

The Mount Rushmore National Memorial is located in the Black Hills region of South Dakota. The Park is forested, with ponderosa pine being the dominant vegetation type. The Park vegetation is described in Section 3.4.1. The Presidential Trail, a walking trail and boardwalk, provides beautiful views of the mountain sculpture and surrounding mountain slopes and ridges.

The new wastewater treatment facility is located northeast from the mountain sculpture, in the industrial area of the Park. The adjacent area is mostly vegetated with forested cover, including grass, shrubs, and trees approximately 50 feet high. Due to topography and vegetative cover, this industrial area is hidden from sight from the visitors' areas and from the majority of the Park. Various utilities, the majority of which are located underground, service the many structures within the Park. Existing utility corridors are vegetated with grassy vegetation and maintained by mowing.

3.7.2 Environmental Consequences

3.7.2.1 Alternative 1: No Action

Under Alternative 1, the proposed construction would not occur and visual quality would not be directly impacted. However, the existing water supply may not be sufficient for fire prevention or fire suppression, which could result in higher risk of catastrophic fire. In the event of a fire at the Memorial, there would be short- to long-term impacts on visual quality, resulting in reduction in scenic integrity. The intensity of this impact could range from minor to major, depending on the severity of the fire. Therefore, minor to major, short- to long-term, adverse impacts on visual quality could result from implementation of Alternative 1.

3.7.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Under Alternative 2, there would be short-term, minor to moderate impacts on visual quality as a result of construction activities. An aboveground tank would be constructed adjacent to the wastewater treatment facility within the boundaries of the industrial area under this alternative. Construction of the aboveground tank would disturb an area of approximately 2500 square feet and would require removal of vegetation from the site, primarily grasses and brush, but also a few trees. Due to the desired capacity of 1.5 to 2 million gallons, the tank could be as tall as 106 feet. The tank could be partially buried or aboveground, depending on the engineering design and geology of the site. The tank could be approximately 50 feet higher than surrounding forested vegetation. However, the height of the tank would not impact visual resources at the visitor facilities on the Memorial due to the distance of the industrial area from the visitor facilities, as well as topography and vegetative cover. Only the Park personnel and workers have access to the industrial zone. While there would be long-term, adverse impacts on visual quality in the area of the wastewater treatment plant, these impacts would not be major, and no impacts on visitors are anticipated.

A new main irrigation trunk line would be installed from the tank to connect to the existing grounds irrigation system. This irrigation trunk line would be constructed underground along existing utility corridors and under the Presidential Trail. The new trunk line would be installed permanently, and would connect to the existing underground irrigation system adjacent to each individual irrigation area (Presidential Parking, Orientation Center, Concession, and Visitor Center). Short-term, minor to moderate impacts on visual quality could be expected as a result of construction activities due to the presence of workers, equipment, and materials in these areas. These impacts would primarily occur during construction of the main irrigation trunk line around Presidential Trail and Sculptor's Studio since these areas would be very visible to visitors. The intensity of visual quality impacts on visitors at the Presidential Trail would depend on how the visitors are diverted away from the construction site, distance from the construction activities, and limitations in the scenic views. Therefore, minor to moderate impacts on visual quality resulting in reduction in scenic integrity could be expected.

All areas disturbed during construction would be reseeded with native vegetation. Revegetation of the disturbed areas would alleviate adverse visual quality impacts associated with the construction activities and avoid long-term impacts from construction.

Temporary aboveground distribution lines would be connected to the main trunk line for irrigation, when needed, and would be removed and stored whenever not needed. The presence of these lines would have minor, short-term, adverse impacts on visual resources at the Park. Although this impact would be short-term, it would be recurring over the long-term.

3.7.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Under Alternative 3, wastewater effluent would be stored in a lined surface reservoir with a capacity of 1.5 million gallons. The reservoir would be located in the same industrial area as the aboveground tank described under Alternative 2 above. The exact dimensions of the reservoir are not yet known; however, it would require a larger area of disturbance than the tank under Alternative 2. Regardless of the larger area of disturbance, short-term visual quality impacts would still be minor to moderate during construction activities associated with the reservoir. All other construction impacts on visual quality, such as from construction of the main trunk line, would be the same as those described for Alternative 2 above.

Long-term impacts associated with the storage reservoir under Alternative 3 would be somewhat different than those described under Alternative 3. While the berms that would be constructed around the reservoir would be elevated several feet from the ground, they would not be nearly as tall as the aboveground tank described under Alternative 2, and would have a less intense visual quality impact than the aboveground tank over the long-term. Long-term impacts associated with the construction site, main trunk line, and temporary distribution lines would be the same as those discussed for Alternative 2 above.

3.7.3 Cumulative Impacts

Under the No Action alternative, there is a possibility that a shortage of water resources could result in higher risks of unsuccessful fire suppression in the event of a fire, resulting in adverse impacts on visual quality. However, other Park projects occurring on the Memorial are targeted to reduce the potential for wildfires. The Memorial recently approved its revised Fire Management Plan, which calls for the suppression of all naturally ignited and man-made wildfires, and allows for proactive efforts to help reduce the current high fire risk to the Memorial through expansions in the Memorial's thinning and prescribed fire programs. Therefore, no significant adverse cumulative impacts on visual quality would result from Alternative 1.

Eliminating the risk for a catastrophic fire to occur in the area through implementation of Alternative 2 or 3, in combination with future fire management projects, would further reduce the potential for adverse visual impacts to occur. Therefore, Alternative 2 or 3 would contribute to long-term, minor to moderate, beneficial, cumulative impacts on visual resources.

3.8 VISITOR USE AND EXPERIENCE (INCLUDING PARK OPERATIONS)

3.8.1 Affected Environment

Visitor/Recreation Experience: The psychological and physiological response from participating in a particular recreation activity in a specific park setting.

Source: Haas, 2001

Visitors come to national parks seeking a pleasurable experience. Visitor or recreation experience is defined as "the psychological and physiological response from participating in a particular recreation activity in a specific park setting" (Haas, 2001).

Most visitors spend short-day periods at Mount Rushmore National Memorial. Visitor use is highest during the months of May through September, with July as the most popular month. During the peak visitation days, approximately 25,000 to 30,000 people visit the Memorial (NPS, 2000a). The Park receives approximately 2.7 to 3 million visitors each year.

The Memorial offers a variety of interpretive programs, musical performance, guided walks, afternoon children's activities, studio talks, and a lighting ceremony held nightly from May to September in the Park's amphitheatre. The July 4th holiday fireworks show, which began in 1998, has become widely popular. This nationally televised event attracts an attendance of over 30,000 people on-site and reaches millions of people throughout the nation (NPS, 2002a).

The significance of Mount Rushmore National Memorial is the sculpture itself, as well as the historic structures and artifacts associated with the carving. The sculpture was carved during the period from 1927 to 1941, from the southeastern face of a granite upthrust (NPS, 2000a). Visitor use and experience is overwhelmingly dominated by the sculpture of the busts of four U.S. Presidents: George Washington, Thomas Jefferson, Abraham Lincoln, and Theodore Roosevelt.

Important to the sculpture is the natural scene surrounding and framing it. A stand of ponderosa pine on the adjacent steep slopes provides a setting that complements the carving and contributes eloquently to its full aesthetic appreciation (NPS, 2000a).

Visitors to Mount Rushmore are able to visit the Historic Borglum Studio, which houses the 1:12 scale model that Gutzon Borglum used as the guiding model for carving Mount Rushmore. Interpretive programs are given in the studio each day during summer months. Park visitors may also walk the 0.6-mile Presidential Trail to get within 600 feet from the Sculpture. A portion of this trail is handicap-accessible.

Over the past 10 years, visitor use facilities at the Memorial have undergone major redevelopment. Old facilities were replaced with new granite structures, which were designed to complement the surrounding ponderosa pines and granite hills. The newly built Visitor Center includes two theaters and a museum. The Park concessionaire operates a dining room, snack bar, and gift shop (NPS, 2000a).

3.8.2 Environmental Consequences

3.8.2.1 Alternative 1: No Action

Under Alternative 1, the proposed construction of an effluent recycling system would not occur. Recreational opportunities currently available would still be available, and would remain unchanged under this alternative. The Memorial would remain in operation under existing conditions.

Over the long-term, the existing water supply may not be sufficient for irrigation or fire suppression, which could result in higher risk of wildfire. Therefore, minor to moderate, long-term, adverse impacts on visitor use and experience, Park operations, and Park facilities could potentially occur under Alternative 1. In the event of both structural and catastrophic fires, insufficient fire suppression could result in damage to important visitor use buildings and facilities, and adversely affect visitor experience. In addition, wildfire could cause damage to Park infrastructure, including utilities, with adverse effects on Park operations. Depending on the intensity of the fire and damage to Park infrastructure, this impact could range from minor to moderate and from short- to long-term.

There is also the potential that freshwater would not be available in sufficient quantities for future uses under Alternative 1. Insufficient water supply on the Memorial could result in minor to moderate, short- to long-term, adverse impacts on Park operations. There is the potential that water supply would not be sufficient for day-to-day operations, potentially resulting in limitations of services currently provided at the Memorial. Changes in services could adversely impact Park visitation and alter visitor experience.

3.8.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Under Alternative 2, construction of the proposed effluent recycling system would be conducted over an approximately 6-month period. Since some construction activities are weather-dependant, construction would intercede into the Park's traditional on-season periods.

The underground main trunk line would be constructed within existing utility corridors, around the Sculptor's Studio, and under the Presidential Trail. During the construction of the main trunk line, the NPS would close the portion of the Trail undergoing construction at any given time to visitors, and would divert visitors around the construction. No major impacts on visitor use and experience are expected as a result of the diversion since the sculpture, as a main Park attraction, is located high above the Presidential Trial, visible from most of the Park's locations and viewpoints. In addition, only small portions of the Trail would be under construction at one time. Therefore, visitors could enjoy spectacular view of sculpture from many other viewpoints in the Park.

It is possible that visitation to Mount Rushmore would decrease during construction activities around the Presidential Trail and Sculptor's Studio. While these impacts could be minor to moderate in intensity, they would be short-term in duration, lasting only a few weeks. Since the main irrigation trunk line would be constructed underground and underneath the Presidential

Trail, it would not be visible to Park users over the long-term, and no long-term impacts on visitor use and experience are anticipated as a result of this main line.

Noise generated during construction activities under the Presidential Trail and around the Sculptor's Studio would particularly impact visitors using these portions of the Park. In addition, the amphitheatre, located behind the Visitor Center, is very sensitive to noise. In two areas, construction would occur within 100 feet of the Sculptor's Studio and the Memorial amphitheatre, and these facilities would be exposed to "clearly unacceptable" noise levels. Similar effects would be experienced by visitors using the Presidential Trail. However, these effects on visitor use and experience would be short-term, localized (only affecting certain portions of the Park at any given time), and moderate in intensity. To mitigate these adverse effects, the majority of the main trunk line would be constructed during low visitation months, from late September to early April.

No major, adverse noise impacts on visitor use and experience are anticipated from construction of the aboveground storage tank. Due to the distance of the construction site from the visitor facilities, as well as the forest buffer between these areas, which has the ability to impede the propagation of sound, noise impacts from construction of the tank would be within the "normally acceptable" noise standards for a natural recreation area.

Over the long-term, operation of the irrigation system, including inline pumps and the pumping station, would generate minor noise levels. To minimize or avoid adverse impacts associated with this noise, any noise-generating equipment would be located away from visitor use areas to ensure that operational noise is inaudible at such locations.

Concerns have been expressed by the public regarding the potential for the effluent irrigation system to result in offensive odors throughout the Park. However, the wastewater effluent has no odor after treatment. Therefore, no adverse impacts on visitor use and experience from odors are anticipated, and no degradation of the local area is expected.

In addition, no adverse impacts on visitor use and experience from changes in visual quality are anticipated to occur under Alternative 2. The height of the aboveground storage tank would depend on its dimensions: a tank 50 feet wide and 50 feet long would be approximately 75 (for 1.5 million gallons) to 105 (for 2 million gallons) feet tall. The tank would be constructed in the industrial area within the existing wastewater treatment facility site, where such development is expected. The site is approximately 1,200 feet away from the closest visitor facility and is surrounded by mature forest. The tank would not be visible from any of the Memorial facilities used by visitors due to the height of the forest cover.

Over the long-term, an effluent recycling system would beneficially affect visitor use and experience, Park facilities, and Park operations. Reuse of effluent discharged from the wastewater treatment plant would preserve freshwater supplies at the Memorial and provide for continuous day-to-day Park operations. In addition, this alternative would provide for sufficient water supply to be available for fire management activities, greatly reducing risk of catastrophic structural and other fires. Elimination of fire danger would reduce the risk of losing an important visitor use building, thus eliminating adverse impacts on visitor experience.

3.8.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Impacts on visitor use and experience resulting from Alternative 3 would be the same as those resulting from Alternative 2. Refer to Section 3.8.2.2 for a discussion of these impacts.

3.8.3 Cumulative Impacts

Under Alternative 1, freshwater resources at the Park may not be available in sufficient quantities for future uses or needs. Moreover, in the case of wildland fire, a shortage of water resources could result in higher risks of unsuccessful fire suppression, resulting in adverse impacts on visitor use and experience. However, most efforts undertaken by the Memorial are aimed to improve visitor use and experience and Park operations. The safety of visitors to the Memorial is a high priority. The Park staff conducts numerous activities to reduce the potential for fire danger and protect visitors. While Alternative 1 would not work in this direction to further improve visitor safety and experience or Park operations, since other activities conducted on the Park are benefiting these resources, this alternative would not contribute to significant, adverse cumulative impacts on visitor use and experience or Park operations.

Implementation of Alternative 2 or 3 would not generate any long-term adverse impacts on visitor use and experience or Park operations. Adverse impacts under Alternative 2 or 3 would be experienced only during the construction period. Over the long-term, beneficial impacts on visitor use and experience and Park operations are likely to occur. Reuse of effluent discharged from the wastewater treatment plant would preserve freshwater supplies, provide for continuous day-to-day Park operations, and reduce the potential for catastrophic fires to occur. Since other activities being conducted on the Park are also aimed at improving visitor use, fire suppression, and Park operations, Alternatives 2 and 3 would contribute to long-term, beneficial, cumulative impacts on visitor use and experience and Park operations. In addition, the proposed irrigation system would increase the potential for appropriate conditions to be met for the Memorial to conduct the July 4th fireworks program over the long-term, due to improved fire suppression and irrigation capabilities.

3.9 SOCIOECONOMICS

3.9.1 Affected Environment

The Mount Rushmore National Memorial includes an area of approximately 1,238 acres in Pennington County, South Dakota. The Memorial is bordered to the northeast by the town of Keystone (population 311). Other major landholdings in the area of the Memorial are primarily Federal lands managed by the NPS, Forest Service, and U.S. Fish and Wildlife Service. State lands include Custer State Park. Interspersed between these Federal holdings are small pockets of private land. Major population concentrations in the nearby area include Custer, Rapid City, Hot Springs, Hermosa, and Hill City, all within the State of South Dakota.

One well currently provides the Park's freshwater supply. Approximately 7 million gallons of water are pumped from the well annually, the majority between April and September. On average,

approximately 19,000 gallons of freshwater are used daily for residential (2,000 gallons/day) and visitor (17,000 gallons/day) use. In addition, approximately 36,000 gallons per day from April to September are used for grounds irrigation and vehicle and pavement cleaning. Water pumping records at the Memorial indicate that total freshwater use during the peak summer season can reach 75,000 gallons per day (Foss, 2003b). Leakage of irrigation lines can also occur, causing significant loss of freshwater. Recently, a major leak in the irrigation system resulted in a loss of 80,000 gallons of fresh water per day prior to its discovery and repair. Additional uses of the water supply at the Memorial have been identified, including expanding irrigation and fire suppression and mitigation.

The current cost of freshwater at the Memorial is $5.43 per 1,000 gallons. On average, freshwater use at the Memorial costs approximately $300 per day (see **Table 3-11**). Freshwater usage costs total approximately $42,000 during the Park's peak visitation period (140 days). The majority of costs are incurred from irrigation and vehicle and pavement cleaning. This is almost twice as much as residential and visitor costs combined.

Table 3-11. Current Average Water Usage at Mount Rushmore

Use	Gallons Used Per Day	Cost Per Day	Cost During Peak Park Period (Mid April - Mid September)
Residential	2,000	$10.86	$1,520.40
Visitor	17,000	$92.31	$12,923.40
Grounds Irrigation/ Vehicle & Pavement Cleaning	36,000	$195.48	$27,367.20
Total	**55,000**	**$298.65**	**$41,811**

3.9.2 Environmental Consequences

3.9.2.1 Alternative 1: No Action

Under Alternative 1, wastewater effluent would not be stored for reuse and the Memorial's freshwater would continue to be used for all Park purposes and operations. The costs associated with pumping and use of this freshwater would continue to be incurred by the NPS under current patterns and fluctuations.

While Alternative 1 would not likely affect socioeconomic resources in the short-term, the continued use of freshwater supplies for non-potable uses could have adverse impacts on this resource area over the long-term. There is the possibility that insufficient quantities of freshwater would be available for future use at the Memorial. The water supply may not be sufficient for Park operations and daily activities, resulting in limitation of services currently provided at the Memorial. Service limitations could adversely alter Park visitation and direct spending by visitors. Diminished levels of visitor spending could be expected to directly affect income in the Park concession-operated dining room, snack bar, and gift shop.

In the event of a fire, insufficient water supply for fire suppression could result in damage to important Park structures and facilities. Depending on the intensity of the fire, damage could range from minor to total destruction of the affected buildings, with adverse impacts on

socioeconomic conditions at the Park. A fire could cause displacement of the employees in the affected building until the building has been restored, reconstructed, or otherwise rendered safe and usable. Employees and the jobs they perform would likely be disturbed for a period of time, which could have adverse economic, as well as social, impacts. A severe fire at the Memorial would put at risk the historic structures and artifacts associated with the sculpture, and could result in adverse impacts on Park visitors.

In addition, the cost incurred as a result of a severe fire, including the costs associated with building repair or reconstruction (including man hours), could affect the economics of the Park. Since these costs are not predictable, and are not part of the annual allocated budget for the Park, NPS incurrence of these costs may, at times, result in the NPS exceeding its annual budget for operation of the Park.

3.9.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

[NOTE: Construction cost estimates provided in this section are derived from calculations provided in the *Feasibility Study for Mt. Rushmore National Memorial Fire Protection Irrigation System, 2003* (MRNMS, 2003) prepared by Wyss Associates, Inc.]

The short-term economic impacts of Alternative 2 would depend largely on who is awarded the construction contract. The higher the percentage of local suppliers, materials, and labor the higher the local benefits. Through the use of local contractors, benefits to the local economy would be seen through wages, overhead expenses, materials costs, and profit. Local commercial entities in the community may expect to see some short-term, negligible increase in activity related to expenditures by the project workforce. Some beneficial economic effects may be experienced in the project area for per diem expenditures (meals, incidentals, etc.) by workers during the time they are in the local area. Construction workers are likely to purchase food and shop in local stores; however, the resulting impact on the local economy would be short-term and negligible.

Construction of the proposed aboveground storage tank would cost the Memorial a one-time installation cost. The estimated cost for aboveground tank construction would depend on the size and type of the tank. The costs associated with the construction of a steel water tank (1.5-million-gallon or 2-million-gallon capacity), a new main irrigation trunk line, and associated irrigation system components (pumps, etc.) would be approximately $3.2 to $3.8 million, depending on the size of the steel water tank (MRNMS, 2003). This would be a one-time cost incurred by the NPS.

Numerous opportunities exist for the reuse of effluent at the Memorial, including additional grounds irrigation and structural and wildfire mitigation and suppression. Irrigating adjacent forests during drought seasons would greatly reduce the potential for a catastrophic wildland fire to occur while saving freshwater resources at the Memorial. In addition, reduction in costs associated with the lower potential for severe fires to occur could be expected.

Implementation of Alternative 2 would decrease freshwater use at the Memorial during the peak Park period by about 65 percent. The daily and total savings incurred by the NPS during the

peak Park period from this reduction in freshwater use would be approximately $194 and $27,000, respectively. Decreased costs associated with decreased freshwater use would allow more of the Park's allocated budget to be spent on other Park projects aimed to improve and enhance visitor experience, and provide for visitor and Park personnel safety. Although these savings would be long-term in duration, they would be negligible since the annual budget for FY 2003 at the Memorial was $2,529,000 (NPS, 2003b). The NPS would save approximately 1.1 percent of its annual budget for the Memorial.

The costs of operation and long-term maintenance of the new effluent recycling system is not available at the present time. Estimated costs will be available after engineering specifications are completed and the modified Surface Water Discharge permit is issued. However, a substantial, additional demand on financial resources is expected to operate and maintain the new effluent recycling system.

The majority of public comments received during scoping for this project were in favor of the project. However, concerns were expressed over the quality of the effluent, and the potential for health problems due to exposure to the effluent. As discussed in Sections 3.3 and 3.10 of this EA, various measures would be in place to ensure the effluent reused on the Memorial is of sufficient quality to meet all water quality standards for the protection of health. Therefore, no major adverse social impacts are anticipated to result from Alternative 2.

3.9.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

General impacts on socioeconomics resulting from Alternative 3 would be similar to those resulting from Alternative 2. Refer to Section 3.9.2.2 for a discussion of these impacts.

The primary difference between Alternatives 2 and 3 are associated with construction costs. The estimated one-time cost of construction of an open reservoir for effluent storage (and associated main trunk line and irrigation system costs) under Alternative 3 would be approximately $1.4 million (MRNMS, 2003); $2.4 million less than that for Alternative 2.

3.9.3 Cumulative Impacts

Implementation of Alternative 1 would not eliminate the risk of potential future wildland fires at the Memorial. However, numerous fire management activities, such as suppression of all naturally ignited and man-made wildfires, prescribed fire, and thinning, conducted at the Park are aimed to eliminate the risk of catastrophic fire. While Alternative 1 would not be working to further reduce this risk or improve fire suppression capabilities, since other activities are working in this direction, implementation of Alternative 1 would not result in significant, adverse, cumulative impacts on socioeconomics associated with the risk of catastrophic fire.

Under Alternative 1, the potential for appropriate conditions to be met for the July 4th fireworks program would solely depend on the natural environment, as would associated socioeconomic impacts from visitation and related revenues from this event. However, in the absence of the July 4th fireworks program, other enhancement features, such as laser light show, would be available to provide an enjoyable experience for the Memorial visitors during the holiday period.

Implementation of Alternative 2 or 3, along with other fire management activities occurring on the Park, would reduce the risk of potential future wildland fires at the Memorial to occur, thus reducing the potential costs related to fire damage. Implementation of these action alternatives would increase the potential for appropriate conditions to be met for the Memorial to conduct the July 4th fireworks program over the long-term, due to grounds irrigation and improved fire suppression capabilities. Therefore, long-term, beneficial, cumulative impacts on socioeconomic would be anticipated under Alternative 2 or 3.

3.10 HUMAN HEALTH AND SAFETY

3.10.1 Affected Environment

One of the core values of the NPS, as stated in *NPS Management Policies,* DO and Reference Manual #50B, *Occupational Safety and Health Program*, and DO and Reference Manual #50C, *Public Risk Management Program*, is the safety and health of its employees, contractors, volunteers, and the visiting public. It is the policy of the NPS to provide a safe and healthful place of employment, to protect Federal and private property from accidental damage or loss, and to meet or exceed all applicable statutory, regulatory, and policy requirements relating to safety, health, and the environment.

Well water is treated by chlorination at the Mount Rushmore water treatment facility. There are three sources of freshwater available at the Memorial: a 200-foot well (Well No. 3), a 490-foot well (Well No. 4), and a gallery. Of these sources, Well No. 3 is the only source regularly used at this time. Well No. 4 and the gallery are not in compliance with South Dakota drinking water standards due to iron and manganese problems. In addition, the gallery is likely to be considered a surface water due to aboveground intermittent flows, and as such, would be significantly more expensive to treat for potable use. Well No. 4 is capped (NPS, 1995).

The Mount Rushmore National Memorial has an existing grounds irrigation system in place, which is used to dampen the grounds to decrease the risk of a fire at the Memorial. This irrigation system currently uses fresh (potable) water. The quantity of freshwater available for use at the Memorial is unknown, and may or may not be enough to sustain all current uses.

3.10.2 Environmental Consequences

3.10.2.1 Alternative 1: No Action

Under Alternative 1, wastewater effluent would not be stored for reuse at the Mount Rushmore National Memorial, and the Memorial's freshwater supply would continue to be used for all Park purposes, including fire suppression and grounds irrigation. While Alternative 1 would not directly affect human health and safety, continued use of the Memorial's freshwater for all purposes could indirectly and adversely affect human health and safety over the long-term in the event that the freshwater supply runs out. Since the quantity of freshwater available from the

well at the Memorial is unknown, there is the potential that insufficient quantities of freshwater may be available in the future.

In the event of a fire at or on lands surrounding the Memorial, the existing freshwater supply may not be sufficient for fire control or suppression, which could pose a long-term, moderate to major threat to visitor and employee health and safety at the Memorial depending on the severity of the fire. Without an adequate fire suppression water supply, a fire in the area would continue to worsen until local services arrived, and could damage property and endanger lives. Although the potential for this situation to occur would be low, any potential for endangerment or loss of human life would be considered a major adverse impact.

3.10.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Since many construction activities are weather-dependent, construction of the aboveground water storage tank would likely occur during peak visitation times at the Memorial. However, various safety measures would be in place to protect the public and employees from dangers at the construction site, and to restrict access to the site. Barricades or fences would be installed around the construction sites to prevent non-contractors and the public from entering the construction areas. These barricades would be regularly maintained and would be illuminated at night (NPS, 1997a). The construction contractor would also be required to post construction warning signs to notify employees and the public of the construction site and dangers at the sites. All required signage per the *Manual on Uniform Traffic Control Devices* (USDOT, 2001) would be installed and maintained around the construction sites and along the road to the wastewater treatment facility (NPS, 1997a).

To protect the public and employees from dangers associated with the installation of the new irrigation trunk line, orange fencing would be placed around any open trench during construction. Any excavated trenches would be refilled with excavated soil immediately following the placement of the pipe in the trench. No trenches would be left exposed overnight; excavated trenches would be required to be refilled by the close of work for the day. The NPS would require that the majority of water line installation activities occur during off-peak months at the Memorial, particularly during installation under the Presidential Trail. The NPS would close the portion of the Trail undergoing construction at any given time to visitors, and would divert visitors around the construction.

Other construction safety standards and requirements would be built into the construction contract for the project. The NPS has a set of construction contract standards, which contractors for NPS projects must follow during construction. As part of these specifications, the contractor is required to designate and post a hard hat area. All workers or visitors to the construction site are required to wear hard hats, in addition to any other necessary protective equipment, at all times. At least six hard hats are required to be stored on-site for use by visitors (NPS, 2000c).

The NPS construction contract specifications also include additional worker safety requirements. An accident prevention program would be established before work begins to ensure worker and visitor safety. Among other things, the program must include: the name of the supervisor responsible for carrying out the program; a list of weekly and monthly safety meetings; first aid

procedures; an outline of each phase of work, with hazards associated with each phase and the methods of ensuring safety; training in first aid and hazardous materials handling; planning for possible emergency situations (such as floods or fires); and fire protection. The program must be reviewed by the NPS contracting officer for compliance with OSHA requirements. In addition, all mechanical equipment present on the construction site must be OSHA inspected (NPS, 2000c).

Personal protective equipment would be available on-site, and would be inspected daily for maintenance. Adequate first aid facilities would be provided on the construction site in the event of an accident. Emergency phone numbers, including ambulance, hospital, police, and fire department numbers, would be posted at the work site with reporting requirements (NPS, 2000c). With all of these safety measures in place, adverse impacts to worker safety resulting from construction activities would be short-term and negligible to minor.

Fuel products (petroleum, oils, and lubricants) would be needed to operate some of the heavier equipment used during construction activities. As with almost any construction project involving the use of heavy equipment, there is some risk of an accidental fuel product or chemical spill or unplanned release of some other toxic or hazardous contaminant, which could adversely affect human health and safety and natural resources. All employees that would be exposed to hazardous materials at the construction site would be trained and instructed in approved methods for handling and storage of such materials (NPS, 2000c). Therefore, the probability of an accidental spill would be very low. In addition, the NPS would require mitigation specifications to control fuel and equipment storage and handling for the project. All fuel, construction materials, and equipment storage would occur away from any surface water resource. In the event of an accidental spill, the construction contractor would be required to contact the Park, which would then contact hazardous material cleanup contractors. All fuel or chemical spills would be required to be contained and cleaned up in accordance with USEPA and OSHA regulations. Therefore, with the implementation of these measures, the potential for an accidental chemical or fuel spill to occur and result in adverse impacts on human health and safety would be negligible.

The degradation of human health and safety due to soil erosion and surface water runoff impacting water quality, and fugitive dust impacting air quality, would be controlled throughout all stages of construction by best management practices (BMPs), discussed in above sections. With these measures in place, impacts on human health and safety due to fugitive dust or water quality degradation would be negligible, at most.

No adverse impacts on human health and safety are anticipated from the use of the wastewater effluent in the irrigation system. The quality of the treated effluent is of such quality as to not pose a threat to visitor or employee safety. As discussed in Section 3.3, *Water Resources*, the South Dakota DENR would require more restrictive water quality parameters to protect human health and safety during irrigation with the effluent. In addition, in accordance with DENR requirements, all irrigation activities would occur during times when people are not present, such as in the early morning, evening, and nighttime (Thunstrom, 2003a). Therefore, the potential for visitors to be accidentally contacted or sprayed with the effluent would be very small. In addition, no adverse impacts on public health and safety at the wastewater treatment facility and

storage site would be anticipated over the long-term. The public is not authorized to enter the site, and there is a no trespassing/warning sign posted outside the facility.

Over the long-term, beneficial, indirect impacts on human health and safety would be anticipated to result from Alternative 2. This alternative would greatly reduce, if not eliminate, the potential for the Memorial's freshwater supply to be depleted, and an insufficient water supply to be available in the event of a fire, which would reduce the potential for loss of life and property and the need for rescues during fire events. In addition, constructing the main trunk line under the Presidential Trail would allow the NPS to irrigate to conduct fire suppression activities on a larger area of grounds through the connection of temporary lines. This would decrease the potential for a catastrophic wildfire to occur on these lands and threaten visitors and employees at the Memorial, as well as on adjacent lands.

3.10.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Short-term (construction-related) and long-term (operational) impacts on human health and safety resulting from Alternative 3 would be very similar to those resulting from Alternative 2. Refer to Section 3.10.2.2 above for a discussion of these impacts. The primary difference would be the presence of an open reservoir under Alternative 3. While this reservoir would not be open to the public, and the public would still be restricted from the area, there is the potential for this reservoir to be constructed up to the edge of the road to the treatment facility, which could pose risks to users of the road (both vehicles and pedestrians). To reduce risks associated with an open reservoir, if the reservoir were to be constructed up to the road, the NPS would construct a fence or railing along the side of the road between the road surface and the reservoir. In addition, the NPS would post signage under Alternative 3 noting the presence of the open reservoir, and restricting public access.

3.10.3 Cumulative Impacts

Cumulative impacts on human health and safety would largely be beneficial. Although Alternative 1 would neither reduce the potential for wildland fires to occur nor the potential for the Memorial's freshwater supply to be depleted in the future (and thus, unavailable to control or suppress a fire should one occur), there are other activities occurring on the Memorial aimed at reducing the potential for, and severity of, wildfires. As discussed in Section 3.1, the Memorial recently approved its revised Fire Management Plan, which calls for the suppression of all naturally ignited and man-made wildfires, and allows for proactive efforts to help reduce the current high fire risk to the Memorial through expansions in the Memorial's thinning and prescribed fire programs. Since these activities are aimed at reducing the fire risk at the Memorial, Alternative 1 would not contribute to significant, adverse cumulative impacts on human health and safety.

On the contrary, implementation of Alternative 2 or 3 would work with these other activities at the Memorial to further reduce the potential for a wildfire to occur, and also to reduce the severity of a wildfire if one were to occur. Therefore, long-term, moderate, beneficial impacts on human health and safety would be anticipated under Alternatives 2 and 3. In addition, implementation of these action alternatives would decrease the potential for accidental ignitions

during the 4th of July fireworks celebrations at the Memorial, through irrigation of a greater amount of land than currently occurs.

3.11 CULTURAL RESOURCES

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to consider the effects of their proposals on historic properties, and to provide state historic preservation officers (SHPOs), tribal historic preservation officers, and, as necessary, the Advisory Council on Historic Preservation, a reasonable opportunity to review and comment on these actions. Officially listed cultural resource sites and sites determined eligible or with an undetermined eligibility are of concern. Ineligible sites are dropped from management concerns unless otherwise noted, and determinations of effect on these properties are not addressed in this analysis.

3.11.1 Affected Environment

Mount Rushmore National Memorial was listed on the National Register of Historic Places (NRHP) in 1966 on the basis of the carving of the faces, recognizing that the carving itself was an event of historical significance. The Memorial has engineering, historical, and architectural importance. The remainder of the land within the Park's boundaries is used for scenic protection and administrative facilities.

Numerous designations for additional historic protection of individual sights within the Memorial have been made. These include the establishment of the historic sub-zone for the Visitor Services Area for management purposes and creation of a historic district for an area including the sculpture, the uncompleted Hall of Records, the Sculptors Studio, the residence, the Borglum View Terrace, and other affiliated facilities from the time of the creation of the sculpture, including the lift platform, the compressor, the water reservoir, a stairway, and remnants of railroad tracks, winches, and pulleys. There are no known archeological sites at the Memorial.

Protection measures for a site is developed based on a determinations of the site's eligibility for inclusion in the NRHP. In accordance with Section 110 of the NHPA, NPS is conducting a thorough inventory of historic properties in the Memorial. Several structures are currently listed as classified structures. These include the Historic Residence, Sculptor's Studio, Hall of Records, Water Reservoir, Historic Compressor, Shrine of Democracy Sculpture, Historic Stairway, and Lift Platform. Several other features have been deemed ineligible for listing, but are managed as a resource by the Memorial. These include the Borglum Memorial View Terrace, Doane Mountain Commemorative Plaque, Historic Culverts, and Historic Retaining Walls.

An important feature of the Memorial is the sculpture's historic natural setting. While there has not been any individual cultural landscapes officially identified outside the sculpture itself, it is reasonable to state that the natural characteristics of the landscape is integral to the historical context of the Memorial.

3.11.2 Environmental Consequences

The Mount Rushmore National Memorial consulted with the South Dakota SHPO regarding this project in a letter dated December 6, 2002. The area of consideration during the consultation included the rocky slopes within 1,000 feet of the Memorial, the landscaped areas to be irrigated within the developed grounds, and the area near the sewage treatment plant that has been previously disturbed by construction. In a response letter signed on December 12, 2002, the South Dakota SHPO concurred with the Park's finding that the project would have no adverse effect to historic or cultural resources. However, it was noted that, if any ground disturbance related to the project results in the discovery of any bones, artifacts, foundations, or other indications of past human occupation of the area, the project should be temporarily stopped and the SHPO notified immediately. Appendix B of this EA provides the documentation associated with consultation with the SHPO for this project.

3.11.2.1 Alternative 1: No Action

Under Alternative 1, the proposed effluent recycling system would not be constructed. There would be no activities occurring under this alternative that would directly affect cultural resources. However, continued use of the Memorial's freshwater for all purposes could indirectly and adversely affect cultural resources over the long-term in the event that the freshwater supply runs out. In the event of a fire at or on lands surrounding the Memorial, the existing freshwater supply may not be sufficient for fire control or suppression, which could pose a long-term, moderate to major threat to historic properties at the Memorial, depending on the severity of the fire. Without an adequate fire suppression water supply, a fire in the area would continue to worsen until local services to arrive, and could damage property or completely destroy a historic building on the Memorial. However, the potential for this situation to occur would be low.

3.11.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

As discussed above, in accordance with Section 106 of the NHPA, consultation and comment was solicited from the South Dakota SHPO regarding this project (see Appendix B). A finding of No Adverse Effect on historic and cultural resources was determined. Excavation and other ground-disturbing activities during construction would not affect any archaeological resources, since none are present on the Memorial. All construction activities in the vicinity of any historic buildings, such as the Sculptor's Studio, would be undertaken with extra precaution to protect the structure.

The only potential for cultural resources to be affected by implementation of Alternative 2 would be during the laying out and use of the temporary, aboveground irrigation lines throughout the Park. However, these lines would likely be laid along the bottom of the talus slope of the Mount Rushmore structure, where no cultural resources exist. In addition, the lines would be temporary, only used when necessary for fire suppression, and would not cause any ground disturbance.

Over the long-term, indirect, beneficial impacts on cultural resources would result from implementation of Alternative 2. This alternative would increase the fire suppression capabilities at the Memorial, decreasing the potential for loss or irreparable damage to historic buildings within the Memorial.

Implementation of this alternative would not impair cultural resources or values that are (1) necessary to fulfill specific purposes identified in the enabling legislation of the Memorial, (2) key to the natural or cultural integrity of the Memorial or opportunities for enjoyment of the Memorial, and (3) identified as a goal in the Memorial's general management plan or other NPS planning documents.

3.11.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Impacts on cultural resources from Alternative 3 would be the same as those that would result from Alternative 2. Refer to Section 3.11.2.2 for a discussion of these impacts.

3.11.3 Cumulative Impacts

Cumulative impacts on cultural resources would largely be beneficial. Although Alternative 1 would neither reduce the potential for wildland fires to occur nor the potential for the Memorial's freshwater supply to be depleted in the future (and thus, unavailable to control or suppress a fire should one occur), there are other activities occurring on the Memorial aimed at reducing the potential for, and severity of, wildfires. As discussed in Section 3.1, the Memorial recently approved its revised Fire Management Plan, which calls for the suppression of all naturally ignited and man-made wildfires, and allows for proactive efforts to help reduce the current high fire risk to the Memorial through expansions in the Memorial's thinning and prescribed fire programs. Since these activities are aimed at reducing the fire risk at the Memorial, Alternative 1 would not contribute to significant, adverse cumulative impacts on cultural resources.

On the contrary, implementation of Alternative 2 or 3 would work with these other activities at the Memorial to further reduce the potential for a wildfire to occur, and also to reduce the severity of a wildfire if one were to occur. Therefore, long-term, moderate, beneficial impacts on cultural resources would be anticipated under Alternatives 2 and 3. In addition, implementation of these action alternatives would decrease the potential for accidental ignitions during the 4th of July fireworks celebrations at the Memorial, through irrigation of a greater amount of land than currently occurs.

3.12 UTILITIES AND PUBLIC SERVICES

3.12.1 Affected Environment

Utilities

In general, utilities include the following kinds of facilities and infrastructure:

- *Energy* – gas pipelines and substations, electricity transmission and distribution lines, and electrical substations;
- *Communications* – telephone lines, fiber optics, etc.;
- *Water supply* – water pipelines and water storage tanks; and
- *Wastewater* – sewage pipelines and sewage treatment plants.

Various utilities, including power lines, radio cables, water lines, telephone lines, and sewer lines, are located throughout the area and service the many structures within the Park. Two utility corridors exist within the study area. An underground water line, buried below the hillside, is servicing the south potable water reservoir. An underground water line and an overhead power line are servicing the north potable water reservoir. The north utility corridor, running along a drainage swale, also includes a ground level power cable servicing the top of the mountain (MRNMS, 2003). The vast majority of these lines are located underground; however, there are short sections of overhead power line in the vicinity of the housing area and Sculptor's Studio. Overhead power lines are scheduled for replacement under the ground in the near future.

One well and several reservoirs currently provide the Park's freshwater supply. Water from the well is pumped to a main 0.5 million gallon reservoir located at the well, and then to two pressure reservoirs (0.2 million gallons total) above the visitor/services area. On average, approximately 19,000 gallons of freshwater are used daily for residential and visitor use. Used water from the Memorial facilities undergoes treatment at the newly constructed (2002) wastewater treatment facility. This wastewater treatment plant is designed to treat a maximum of 75,000 gallons per day (6.7 gallons per year). During the peak tourist season, this treatment facility discharges an average of 45,000 gallons of effluent per day into Lafferty Gulch, located directly behind the facility.

Public Services

In this context, public services may include the following services provided by local municipalities and the NPS:

- Fire protection;
- Law enforcement;
- Emergency medical response (EMS); and
- Facility maintenance (trash removal, sanitation activities, etc.).

Fire management on the Memorial is administered with the aid of fire management personnel from Wind Cave National Park. Small fires are controlled, if possible, by an initial attack handcrew. Initial attack at Mount Rushmore includes response within the one-mile-wide zone adjacent to the Memorial. An initial attack crew on a larger fire is reinforced by additional firefighters. If additional personnel or equipment are needed on the fire, the Incident Commander will notify the Park Fire Coordinator who will arrange for additional suppression forces and/or personnel to be available for initial dispatch. Should additional assistance be required, support would come first from the Black Hills National Forest. The Custer Zone Dispatch Center in Custer is informed of any fire activity at the Park and is the requestor for NPS initial attack in the protection zone adjacent to the Memorial boundary (NPS, 2002a).

In 1991, Rapid City and Pennington County, through the planning and guidance of elected officials and various department heads, opted to form a new consolidated public safety communication center to serve all law enforcement, fire, and EMS agencies in Pennington County and the Rapid City Metro area. The 911 center is located in Rapid City and serves the City of Rapid City, Pennington County, City of Box Elder, South Central Meade County, Eastern Custer County, Badlands National Park, and Mount Rushmore National Memorial (PC, No date).

3.12.2 Environmental Consequences

3.12.2.1 Alternative 1: No Action

Alternative 1 would not affect any telephone, power, fiber optic, sewer, or other utility lines on the Memorial. However, in the event of severe fire, fire suppression may require the use of the majority, if not all, of the water stored in the existing freshwater reservoirs at the Memorial. Shortage of water could result in unsuccessful fire suppression, resulting in catastrophic wildfire with damage to Park infrastructure, including utilities. Depending on the intensity of the fire and damage to Park infrastructure, this impact could range from minor to moderate and from short-term to long-term. In addition, usage of freshwater for fire suppression could result in decreased amount of water, including potable water, available to Memorial visitors and staff. While this impact would be short-term, lasting only until existing reservoirs are refilled by the well, this impact could be minor to moderate in intensity.

Short-term, minor to moderate, adverse impacts on public services would occur under Alternative 1. Without adequate fire protection infrastructure to suppress or contain a fire, Memorial fire personnel would have to work longer and harder to control a fire, and fires may become so severe that the use of additional emergency medical and fire personnel would be required.

3.12.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Under Alternative 2, an aboveground tank would be constructed adjacent to the wastewater treatment facility for storage of treated effluent. In addition, a new main irrigation trunk line would be installed from the tank to connect to the existing grounds irrigation system. NPS Management Policies for utility lines (Chapter 9.1.5.3) state that, where feasible, all utility lines will be placed underground, and, where feasible, will share a common corridor with other

utilities and be combined with transportation corridors. In accordance with these policies, the new main irrigation trunk line would be constructed underground along existing utility corridors, and under the Presidential Trail. This main trunk line would be installed permanently, and would connect to the existing underground irrigation system adjacent to each individual irrigation area (Presidential Parking, Orientation Center, Concession, and Visitor Center). The only change to the existing irrigation system would be replacing the sprinkler heads to those compatible for effluent use. Temporary aboveground irrigation lines would be connected to the main trunk line and would be removed and stored when not needed. Prior to the winter season, the tank and irrigation system would be emptied to prevent freezing, reducing the potential for damage to the system pipes.

Construction activities have the potential to interrupt or accidentally damage both underground and overhead utility lines in the vicinity of the project sites. This is characteristic of any construction project and is typically avoided by coordination and consultation with the utility company and utility maps.

Over the long-term, moderate, beneficial impacts on utilities would occur under Alternative 2. Increasing the quantity of water available for use at the Memorial would eliminate the potential for the demand for water to be greater than the supply, particularly during emergency fire situations. In addition, reuse of current effluent discharge would reduce the impact on the Memorial's fresh water resources.

Long-term, minor to moderate, beneficial impacts on public services would also be expected under Alternative 2. Reuse of effluent for grounds irrigation would increase the efficiency and effectiveness of fire personnel efforts in the event of a fire at the Memorial. Alternative 2 would increase the potential for a fire to be adequately contained and/or suppressed, potentially decreasing the amount of time necessary to suppress a fire and potentially eliminating the need for additional outside fire assistance.

3.12.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

General impacts on utilities and public services resulting from Alternative 3 would be the same as those resulting from Alternative 2. Refer to Section 3.12.2.2 for a discussion of these impacts. The only difference between these alternatives would be the construction of an open reservoir instead of a tank for long-term effluent storage under Alternative 3.

3.12.3 Cumulative Impacts

Under Alternative 1, the wastewater effluent would not be reused for grounds irrigation, fire management activities, and other purposes. Not reusing the effluent for fire management activities would maintain risk of fire danger at the current level. The existing fire infrastructure may decrease the efficiency and effectiveness of firefighter crew in the event of future wildfires. However, other NPS activities are aimed to reduce fire risk and ensure safety of visitors at the Memorial. The Memorial recently approved its revised and updated Fire Management Plan, which calls for the suppression of all naturally ignited and man-made wildfires, and allows for proactive efforts to help reduce the current high fire risk to the Memorial through the Memorial's

thinning and prescribed fire programs. Therefore, Alternative 1 would not result in significant, adverse cumulative impacts on utilities and public services.

Over the long-term, moderate, beneficial, cumulative impacts on utilities and public services are expected to occur under Alternatives 2 and 3. Implementation of an effluent recycling system would work with other Park fire management activities to further reduce the potential for wildfire to occur. Reuse of effluent on grounds irrigation would increase efficiency and effectiveness of fire personnel efforts in the event of a future fire at the Memorial. In addition, the proposed irrigation system would decrease the potential for fire danger as a result of accidental fire ignition during the July 4th fireworks program through ground irrigation of a greater adjacent area.

3.13 RESOURCE CONSERVATION

3.13.1 Affected Environment

One well currently provides the Park's freshwater supply. Water from the well is disinfected and chemically treated for pH adjustment, then is pumped to the reservoirs for storage. All potable water used at the Memorial comes from the well, which has been in use since 1969. During that same year, the Black Hills was experiencing one of its worst droughts. Data from a U.S. Geological Survey study conducted at that time indicated that prolonged periods of drought could cause well water shortages. Approximately 7 million gallons of water are pumped from the well annually, the majority between April and September (the highest visitation months). Water from the well is pumped to a main 0.5-million gallon reservoir located at the well, and then to 2 pressure reservoirs (0.2 million gallons total) above the visitor/services area. On average, approximately 19,000 gallons of freshwater is used daily for residential and visitor use. In addition, approximately 36,000 gallons per day from April to September are used for grounds irrigation and vehicle and pavement cleaning. Water pumping records at the Memorial indicate that total freshwater use during the peak summer season can reach 75,000 gallons per day (Foss, 2003b). Significant water losses have occurred due to irrigation system leaks and contractor waste during construction and maintenance activities at the Memorial. Additional uses of the water supply at the Memorial have been identified, including expanding irrigation and fire suppression and mitigation. These additional uses would increase demands on the existing water supply and could cause a water shortage during periods of drought.

Once the water is used, it undergoes treatment at the new wastewater treatment facility (water used for irrigation and cleaning does not get returned to the treatment facility). The new facility has an expected 30-year life cycle and is designed to treat a maximum of 75,000 gallons per day (NPS, 2000a). During the peak tourist season, this treatment facility discharges an average of 45,000 gallons of effluent per day into Lafferty Gulch, which is located directly behind the facility and drains into Battle Creek. The effluent is of high quality and is allowed by the South Dakota DENR to be discharged into an active trout stream.

3.13.2 Environmental Consequences

3.13.2.1 Alternative 1: No Action

Under Alternative 1, the wastewater effluent would not be recycled and would continue to be discharged into Lafferty Gulch, having long-term, moderate, localized impacts on the Park's freshwater supply. The Memorial would continue to use the Park's freshwater supply for grounds irrigation and vehicle and pavement cleaning. Waste of freshwater would likely continue from irrigation system leaks. These current uses and waste of freshwater supplied by the Park's only well could impact the Park's freshwater supply and cause a shortage during periods of drought. Additional uses identified by the Park, expanded irrigation, and fire suppression and mitigation, would increase the demand for freshwater and cause an increased risk of potential shortages in the future where extraction may exceed recharge.

3.13.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Long-term, moderate, localized benefits to the Park's freshwater supply would occur from implementation of the effluent recycling system under Alternative 2. The Memorial would reuse the stored wastewater effluent for grounds irrigation and vehicle and pavement cleaning, which would reduce the impact on the Park's freshwater supply. Reuse of the lower quality effluent would conserve the freshwater supply needed for potable uses, such as consumption and washing. Irrigation system leaks would no longer result in a loss of freshwater. This decrease in freshwater use and waste would reduce the risk of water shortages during periods of drought. Additional uses identified by the Park, expanded irrigation, and fire suppression and mitigation, could be met by effluent reuse, further conserving freshwater supplies.

Sustainability principles for water supply were developed as part of the NPS's Sustainable Design Initiative. Water conservation is a major focus of sustainability and includes using water of lower quality, such as reclaimed wastewater effluent, for uses such as irrigation. Alternative 2 would be in support of this initiative.

Over the long-term, indirect, beneficial impacts on cultural resources and Park facilities would result from implementation of Alternative 2. This alternative would increase the fire suppression capabilities at the Memorial, decreasing the potential for loss or irreparable damage to historic buildings within the Memorial. Preservation of cultural resources is another guiding principal of NPS's Sustainable Design Initiative.

3.13.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Long-term, moderate, localized benefits to the Park's freshwater supply and long-term, indirect, beneficial impacts on cultural resources would also occur from implementation of the effluent recycling system under Alternative 3 (as described above under Alternative 2). Alternative 3 would be in support of NPS's Sustainable Design Initiative.

3.13.3 Cumulative Impacts

Under Alternative 1, current uses and waste of the Park's freshwater supply would continue. Additional uses or needs identified in the future would increase the demand for freshwater at the Memorial and potentially cause a shortage during periods of drought. Therefore, there is the potential for long-term, adverse, cumulative impacts on the Park's freshwater supply from Alternative 1.

Implementation of Alternative 2 or 3 would conserve the Park's freshwater supply over the long-term, contributing to cumulative benefits of conservation measures implemented on the Park.

3.14 WILDERNESS

3.14.1 Affected Environment

While Mount Rushmore National Memorial does not contain proposed or designated wilderness, the Black Elk Wilderness Area lies on the western border of the Memorial.

The Wilderness Act of 1964 established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as "wilderness areas." By law, these wilderness areas "shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness" (16 USC 1131).

The Wilderness Act defined and described a wilderness area as area:

- Where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain;
- Of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation;
- Which generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- Which is protected and managed so as to preserve its natural conditions;
- Which has outstanding opportunities for solitude or a primitive and unconfined type of recreation;
- Which has at least five thousand acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition; and/or
- Which may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.

These attributes serve both as standards for studying areas and evaluating their suitability for inclusion in the national wilderness preservation system and as objectives to guide NPS actions pertaining to the preservation and use of wilderness areas (NPS, 1999; NPS, 2000b).

3.14.2 Environmental Consequences

3.14.2.1 Alternative 1: No Action

Implementation of Alternative 1 would have no direct effects on the Black Elk Wilderness Area. However, in the event of a fire at or on lands surrounding the Memorial, the existing freshwater supply at the Memorial may not be sufficient for fire control or suppression, which could pose a long-term threat to the Black Elk Wilderness Area. The intensity of this threat would be dependent on the severity of the fire. Without an adequate fire suppression/control water supply, a fire in the area could move into the wilderness area, and could impair the integrity of the area.

3.14.2.2 Alternative 2: Store Effluent in Aboveground Tank for Reuse

Implementation of Alternative 2 would have no direct effects on the Black Elk Wilderness Area. All construction would occur within the boundaries of the Mount Rushmore National Memorial, away from the wilderness area.

Over the long-term, beneficial, indirect impacts on the Black Elk Wilderness Area would be anticipated to result from Alternative 2. This alternative would greatly reduce, if not eliminate, the potential for the Memorial's freshwater supply to be depleted, and an insufficient water supply to be available in the event of a fire, which would reduce the potential for a fire to spread into and damage the Black Elk Wilderness Area. In addition, constructing the main trunk line under the Presidential Trail would allow the NPS to irrigate to conduct fire suppression activities on a larger area of grounds through the connection of temporary lines. This would decrease the potential for a catastrophic wildfire to occur on these lands and threaten the Black Elk Wilderness Area.

3.14.2.3 Alternative 3: Store Effluent in Open Reservoir for Reuse

Impacts on the Black Elk Wilderness Area resulting from Alternative 3 would be very similar to those resulting from Alternative 2. Refer to Section 3.14.2.2 above for a discussion of these impacts.

3.14.3 Cumulative Impacts

Cumulative impacts on the Black Elk Wilderness Area would largely be beneficial. Although Alternative 1 would neither reduce the potential for wildland fires to occur nor the potential for the Memorial's freshwater supply to be depleted in the future (and thus, unavailable to control or suppress a fire should one occur), there are other activities occurring on the Memorial aimed at reducing the potential for, and severity of, wildfires. As discussed in Section 3.1, the Memorial recently approved its revised Fire Management Plan, which calls for the suppression of all naturally ignited and man-made wildfires, and allows for proactive efforts to help reduce the

current high fire risk to the Memorial through expansions in the Memorial's thinning and prescribed fire programs. Since these activities are aimed at reducing the fire risk at the Memorial, Alternative 1 would not contribute to significant, adverse cumulative impacts on the Black Elk Wilderness Area.

On the contrary, implementation of Alternative 2 or 3 would work with these other activities at the Memorial to further reduce the potential for a wildfire to occur, and also to reduce the severity of a wildfire if one were to occur. Therefore, long-term, moderate, beneficial impacts on the Black Elk Wilderness Area would be anticipated under Alternatives 2 and 3. In addition, implementation of these action alternatives would decrease the potential for accidental ignitions during the 4th of July fireworks celebrations at the Memorial, through irrigation of a greater amount of land than currently occurs.

THIS PAGE LEFT INTENTIONALLY BLANK

CHAPTER 4
REFERENCES

(AET, 2003). American Engineering Testing. March 2003 . Geotechnical Engineering Services, Mt. Rushmore Irrigation Project, Keystone, South Dakota. AET No. 18-01137. Report sent by W. Feeger, P.E., and R.N. Temme, P.E., to E. Heikes, Wyss Associates, Inc.

(APN, 2001). American Park Network. 2001. Web page. Mount Rushmore Flora and Fauna. Accessed on 16 June 2003. Accessed at: http://www.americanparknetwork.com/parkinfo/ru/flora/index.html

(DENR, 2002). South Dakota Department of Environment and Natural Resources. 2002. The 2002 South Dakota Report to Congress, 305(b) Water Quality Assessment.

(DOD, 1978). United States Department of Defense. 1978. *Environmental Protection: Planning in the Noise Environment.*

(FEMA, 2002). Federal Emergency Management Agency. 19 August 2002. FEMA Funds Authorized For South Dakota's Battle Creek Fire. Web page. Accessed at: www.fema.gov/nwz02125c.shtm.

(Foss, 2003a). United States Department of the Interior, National Park Service, Mount Rushmore National Memorial. 28 July 2003. Email communication with Blaine Foss, Acting Facility Manager.

(Foss, 2003b). United States Department of the Interior, National Park Service, Mount Rushmore National Memorial. 28 July 2003. Email communication with Blaine Foss, Acting Facility Manager.

(Haas, 2001). Hass, Dr. Glenn E. Spring 2001. Visitor Capacity in the National Park System. *Social Science Research Review*, Volume 2, No. 1.

(Holland and Daly, 2003). Holland, Jim and Dan Daly. 18 June 2003. Keystone looks for answers in the embers. Rapid City Journal.com. Online newspaper. Accessed at: http://www.rapidcityjournal.com/articles/2003/06/19/front/top/news01.txt.

(HUD, 1991). United States Department of Housing and Urban Development. 1991. *The Noise Guidebook.*

(Licht, 2003). United States Department of the Interior, National Park Service, Mount Rushmore National Memorial. July 2003. Email communication with Dan Licht, Northern Great Plains Inventory Coordinator/Regional Wildlife Biologist.

(MRNMS, 2003). Mt. Rushmore National Memorial Society. Revised March 2003. *Feasibility Study for Mt. Rushmore National Memorial Fire Protection Irrigation System.* Prepared by Wyss Associates, Incorporated.

(NPS, No date). United States Department of the Interior, National Park Service. No date provided. Web page. Mount Rushmore National Memorial, Nature and Science. Accessed on 16 June 2003. Accessed at: http://data2.itc.nps.gov/nature/index.cfm?alphacode=moru&loc=0.

(NPS, 1995a). United States Department of the Interior, National Park Service, Mount Rushmore National Memorial. June 1995. *Potable Water Study for Mt. Rushmore National Memorial*. Prepared by Black and Veatch and TSP Three, Incorporated.

(NPS, 1995b). United States Department of the Interior, National Park Service. 1995. *Guiding Principles of Sustainable Design*. Second edition, D-902.

(NPS, 1997a). United States Department of the Interior, National Park Service. December 1997. NPS Guide Specifications, Section 01560, *Barriers.*

(NPS, 1999). United States Department of the Interior, National Park Service. August 1999. Director's Order #41 Wilderness Preservation and Management.

(NPS, 2000a). United States Department of the Interior, National Park Service, Mount Rushmore National Memorial. 27 January 2000. *Strategic Plan for Mount Rushmore National Memorial, October 1, 2000 – September 30, 2005*.

(NPS, 2000b). United States Department of the Interior, National Park Service. 27 December 2000. *2001 Management Policies*.

(NPS, 2000c). United States Department of the Interior, National Park Service. August 2000. NPS Guide Specifications, Section 01360-4, *Accident Prevention.*

(NPS, 2001a). United States Department of the Interior, National Park Service. 08 January 2001. *Conservation Planning, Environmental Impact Analysis, and Decision Making.* Director's Order #12 and Handbook.

(NPS, 2002a). United States Department of the Interior, National Park Service, Mount Rushmore National Memorial. August 2002. *Fire Management Plan for Mount Rushmore National Memorial and Environmental Assessment*.

(NPS, 2002b). United States Department of the Interior, National Park Service, Intermountain Support Office, Denver. 13 September 2002. *Sample Impact Threshold Definitions and Methodology Sections*.

(NPS, 2003a). United States Department of the Interior, National Park Service. Last updated 29 February 1998. Web page. Geology Fieldnotes, Mount Rushmore National Memorial, South Dakota. Accessed at: http://www.aqd.nps.gov/grd/parks/moru/

(NPS, 2003b). United States Department of the Interior, National Park Service. Last updated 25 July 2003. Web page. Mount Rushmore National Memorial. Accessed at: http://www.nps.gov/moru/pphtml/facts.html

(NYDEC, 2001). New York State Department of Environmental Conservation, Office of Environmental Permits. Revised 02 February 2001. *Assessing and Mitigating Noise Impacts.* Program Policy, DEP-00-3. Issuance Date 06 October 2000.

(Ode, 2002). South Dakota Department of Game, Fish and Parks. 28 January 2002. Personal communication with David Ode.

(PC, No date). Pennington County. No date provided. Web page. Pennington County 911. Accessed on 19 June 2001. Accessed at: http://www.co.pennington.sd.us/e911/enineone.html

(PCBC, 2002). Pennington County Board of Commissioners. 23 July 2002. Pennington County Ordinance No. 12.

(SDGFP, 2000). South Dakota Department of Game, Fish, and Parks. 08 March 2000. Threatened, Endangered, and Candidate Species of South Dakota.

(Schultz, 2002). South Dakota Department of Natural Resources. 05 August 2002. Personal communication with Brad Schultz.

(Thunstrom, 2003a). South Dakota Department of Environment and Natural Resources, Surface Water Quality Program. 27 January 2003. Written communication from Eric Thunstrom, Natural Resources Project Engineer.

(USDOT, 2001). United States Department of Transportation, Federal Highway Administration. 28 December 2001. *Manual on Uniform Traffic Control Devices 2000*, Revision No. 1.

(USEPA, 1971). United States Environmental Protection Agency. 31 December 1971. *Noise From Construction Equipment and Operations, Building Equipment, and Home Appliances*. Prepared by Bolt, Beranek, and Newman.

(USEPA, 1999). United States Environmental Protection Agency. 1999. NONROAD Emissions Model.

(USEPA, 2000a). United Sates Environmental Protection Agency. 2000. Mobile Source Observation Database.

(USEPA, 2000b). United States Environmental Protection Agency. 12 January 2000. AP-42, Compilation of Air Pollutant Emission Factors, Volume II Mobile Sources.

(USEPA, 2003a). United States Environmental Protection Agency, Office of Air and Radiation, Office of Air Quality Planning and Standards. As of 21 May 2003. Web page. The Green Book, Nonattainment Areas for Criteria Pollutants. Accessed at: http://www.epa.gov/oar/oaqps/greenbk.

(USFS, 2002). United States Department of Agriculture, Forest Service. September 2002. *Battle Creek Fire Rapid Assessment.*

(USGS-NPS, 2003). United States Department of the Interior, Geological Survey and National Park Service. Last updated 29 January 2003. Web page. USGS-NPS Vegetation Mapping Program, Mount Rushmore National Memorial. Accessed at: http://biology.usgs.gov/npsveg/moru/.